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ABSTRACT

News clippings, reviews, and feature articles about the Public Broadcasting System science-adventure series "Nova" are collected here. Included are comments from the New York Times, Washington Post, Christian Science Monitor, and TV Guide. Commentaries are primarily favorable and include synopses of various episodes. (DGC)

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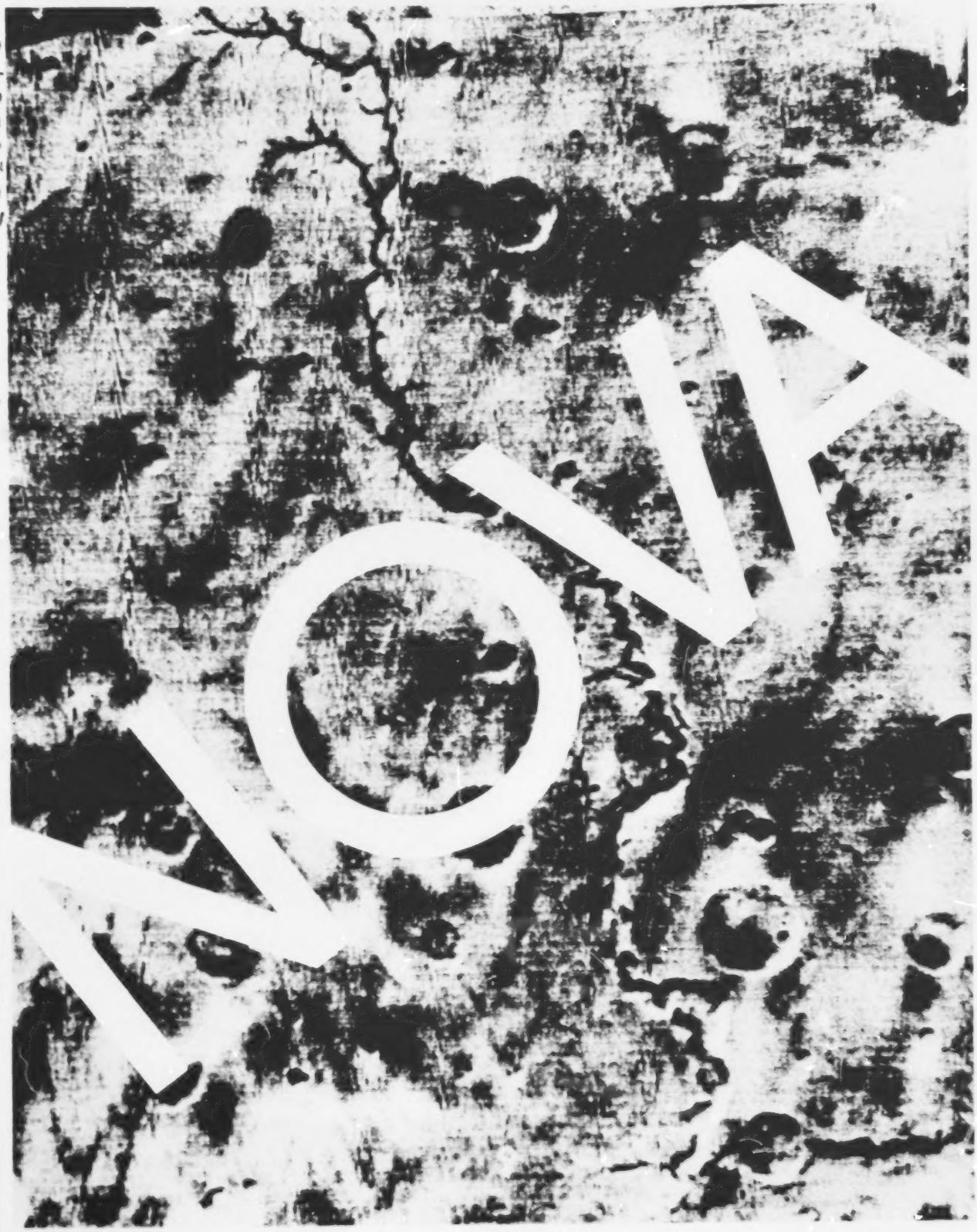

PRIMETIME
March 1974

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NOVA
Sundays at 7:30 pm on 2, 44 & 57; repeated Mondays at 10 pm on 2. Saturdays at 6 pm on 2 & 57

NOVA

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. science program for grown-ups? It's about time. Not that we have anything against *Wild Kingdom*, or Mr. Wizard, or (certainly not) Captain Cousteau, but we've always felt that television could transcend the junior high level in treating the world and universe around us. And now we're going to prove it.

This month marks the debut of *Nova*, our new science series produced with the advice and cooperation of the American Association for the Advancement of Science, you're going to find it fascinating. When we say that it's aimed at grown-ups, we mean grown-ups of all ages (which doesn't have to exclude junior high). All that's required is a healthy curiosity and a sense of the excitement to be found in adventures of the mind.

Adventure is the key word: while each episode of *Nova* is different, they all share this common theme of setting off into the unknown to find answers, solve problems, probe mysteries cosmic and mundane. The thrill of discovery, when it comes, should have you shouting "Eureka!" every time—that's how engrossed we're betting you'll become.

For March, *Nova*'s range extends from tiny fish out into the far reaches of the solar system, to wit:

March 3:

The Making of a Natural History Film

A film about a film . . . one heck of a way to start off a new series? Wrong: a terrific way. A group of inspired Englishmen spend their time these days making spectacular films about subjects no one else would dare touch, including the never-to-be-forgotten stickleback fish. How they do it will—really—amaze you.

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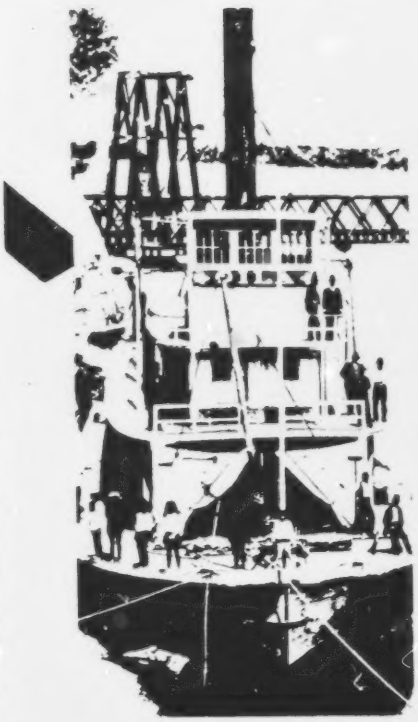
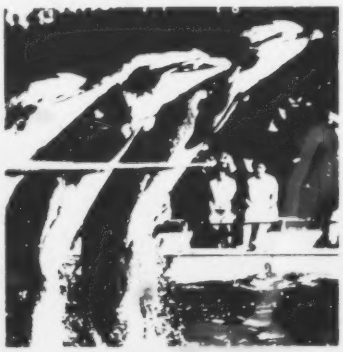


Science adventures for curious grownups

March 17:

Whales, Dolphins and Men

If you're curious about how much of *The Day of the Dolphin* is for real, you'll find out here. You'll see dolphins following complex instructions from men—and passing on the instructions to each other. You'll hear how dolphins and whales communicate, including actual whale songs. And you'll learn how badly man is treating whales (to the point of near-extinction).



March 10:

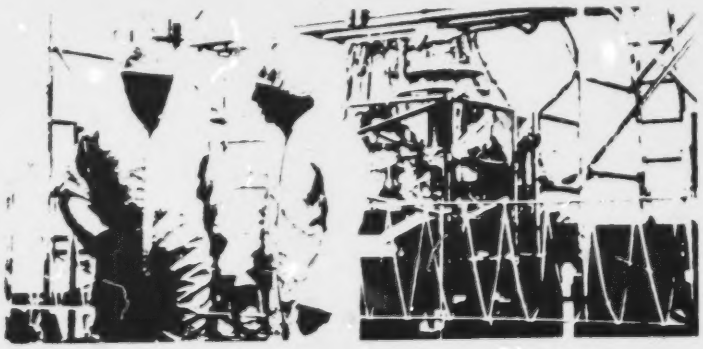
Where Did the Colorado Go?

Until about 1939, it went into the Gulf of California, as it had for millions of years. Not any more. Nowadays the Colorado River stops short, some twenty miles inland, sinking stagnantly into the desert . . . and all because of modern technology and miscalculation. It could happen elsewhere, too, and scientists are working hard to find the solution.

March 24:

The Search For Life

A search leading backward in time and off into space; how did life begin? Some clues must be left from the earth's billion-year prehistory, but there's no definite proof at hand, just a number of theories. Some additional evidence *may* be found by the Viking spacecraft, which will land on Mars in 1976. What Viking discovers could be crucial.



March 31:

The Last of the Cuiva

A vanishing South American Indian tribe, all but cut off from the world of the 1970s. Killed for sport by white cattle ranchers, paddling through jungle swamps and eating (at times) nothing more than flying ants, the Cuiva face an unknown future. An English camera crew lived with them for an entire year so that you could see what they're like close up.

A series of unexpected adventures

by Graham Chedd

Before the turn of the century, Port Isabelle was a thriving, bustling Mexican riverport on the banks of the mighty Colorado where that river reached the end of its 1400-mile journey to the sea. Today Port Isabelle is a few pathetic wooden remains, half-submerged in salty quicksands—the outlines of old docks, the crumbling hulks of boats, scraps of metal, ropes and glass. Undisturbed for 30 years or more by human visitors, its peace was broken one day last fall as a helicopter clattered in from the north, searched for a safe landing place on a section of rotting piling, and set gingerly down. The new arrivals—a film crew from WGBH—quietly and quickly recorded the scene and left the old port to slumber on. The elegaic film sequence that resulted from their visit opens the second program in our new PBS series *Nova*.

It might seem an odd scene for a series devoted to bringing science to the television screen. But in a way it epitomizes the intention of the *Nova* production teams: to show the ways that science—and its offspring, technology—are tightly woven into the fabric of our lives and culture. The Colorado River now ends abruptly some 20 miles inland, far from Port Isabelle. The southwest United States now has electric power and plentiful water supplies as a result of man's exploitation of the Colorado. But the river no longer reaches the sea.

"Where Did the Colorado Go?" is not a typical *Nova* program. Nor will there be such creatures. Michael Ambrosino, the executive producer responsible for *Nova*, intends the series "to give a sense of expectation to the viewer, to the curious who—like me—want to know how the world is put together." The content, style, approach and level of each program will vary. Only the quality, says Ambrosino, will stay the same—and by that he means high. His point is perfectly illustrated by the two films that were in production for *Nova* while "Colorado" was in the cutting room. In one, Boston physicians dressed in the clothes of a century ago were performing in a drama-documentary that explored the huge impact made upon surgical medicine by the discovery of anesthesia. In the other, a production team was visiting research laboratories and locations around the country, investigating the way scientists believe life began on earth some four billion years ago—and the possibilities (good) of life's existence elsewhere in the universe.

Nova's attempt to bring science in from the TV cold, in a regular weekly series of one-hour programs, is a new departure for television—public and commercial—in this country. In Britain, the BBC's *Horizon* series has in its eight years of existence built a reputation and a viewing audience for programs about the role science plays in our culture. Ambrosino readily admits the influence of *Horizon* on *Nova*. It was during a year that he spent at the BBC that the idea for the new series began to form; the three current *Nova* producers each gained his experience in interpreting science for television by working for *Horizon;* several of the best *Horizon* films will be shown in the *Nova* series (including the first in the series, the much acclaimed "The Making Of A Natural History Film"); and the BBC and WGBH are planning a number of co-productions for their respective science series in the future.

Ambrosino intends *Nova* to be "a series of unexpected adventures." So far, it has certainly proved to be that for the production teams. The "Colorado" team, for instance, under its producer Simon Campbell-Jones, in five weeks of research and 23 days of filming, travelled thousands of miles through the southwest by chartered plane, helicopter, station wagon, jeep and boat. Campbell-Jones recalls his first view of the Grand Canyon—flying in a small plane low over the forest at its edges, seeing the Canyon first as a black line breaking the trees, and the world then suddenly "dropping away and slowing down." Ben Shedd, assistant producer, hardly saw the river during the research period, and would hear about it mainly during nightly telephone calls while he was "stuck" in such places as Yuma and Los Angeles, gathering background material for the film. His first glimpse of the Colorado was at the Imperial Dam, where the river stops and "turns into plumbing."

Apart from extensive and rigorous research, perhaps the other most exhausting aspect of making science documentaries is the travel involved and the logistics of getting film crews, bulky equipment, speakers, etc., all together at the right place at the right time.

The sheer practicalities of filming

Graham Chedd works for the AAAS and is a consultant to Nova.

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NOVA

can add other sorts of complications, too. For example, the film on the origins of life and the search for life on other worlds called for some footage devoted to a reconstruction of scenes of the primitive earth, before life evolved. Late last summer, producer John Angier found a perfect location near Cornell University for filming a barren, rocky, lifeless stream. Four weeks later, when he returned to film, it was fall; the stream was full of brown leaves, hardly suitable to depict a world upon which even the most primitive one-celled creatures, let alone trees, had not yet emerged. The crystal, pristine water one now sees in the film was the result of hours of diligent leaf-fishing with long poles.

There are some physical hazards involved in filming the sort of programs with which *Nova* hopes to capture its audiences. Sometimes the danger is to the production team itself—as when the "Colorado" production team was filming on a small scientific raft moored in the middle of Lake Powell. The raft was built to hold two people, and swayed and rocked as some half-dozen tried to balance it. The problem was finally solved by two people jumping overboard.

Sometimes the hazard is to the object being filmed, as when the "Search for Life" cameraman was perched precariously on a gantry above the Viking spacecraft, which is due to look for life on Mars in 1975. Only later did the WGBH team learn of the agitated anxiety of the Viking technicians: even the smallest object falling on the paper-thin fuel tanks of the spacecraft would have ruptured them and caused hundreds of thousands of dollars' damage.

Perhaps the most intriguing of the first three films to be made by WGBH for the *Nova* series is the dramatic reconstruction of the discovery and early use of anesthetics. The story of anesthesia is a fascinating one in its own right, replete with interesting and eccentric characters, controversy, and immense importance: anesthesia, allowing the surgeon time to perform his operations, transformed surgery during the latter part of the 19th century. The *Nova* production team, under producer Francis Gladstone, decided to use "amateur" actors for the film, but "amateur" actors with a difference—all the 19th-century doctors are played by 20th-century teaching physicians currently practicing in Boston. The result, as Gladstone puts it, is that the film has the right "texture." The players, all of whom improvised their scenes with minimal rehearsal, felt comfortable and natural with medical techniques and medical jargon, and appear more "believable" on the screen than the highly paid professional actors who play doctors on many a network television series. Furthermore, the real-life doctors were able to bring many ideas of their own to the scenes being filmed, often quite naturally. (It is no accident that operations in a teaching hospital are carried out in an "operating theatre.")

Almost without thinking, for instance, a "country doctor" told a patient with an infected toe to get up on the kitchen table for the minor surgery required, an instruction obvious to the doctor playing the role, but not to the production team. Incidentally, the results of that operation, when it really took place a hundred years ago, were tragic: the patient died, most probably from the chloroform anesthetic. The case became a *cause celebre* in the early controversy over the safety of anesthesia.

What should the viewer expect from *Nova*? According to Michael Ambrosino: "Some damn good stories about ideas and people he'd never otherwise come into contact with, things that perhaps he's thought he wouldn't understand; like a good book, each film should leave the viewer wanting to find out more. Public television has had a good record of making worthy programs on important topics and exciting programs on light topics, but we want to be exciting *and* important. It's more than playing with the medium. It's what the medium should be doing."

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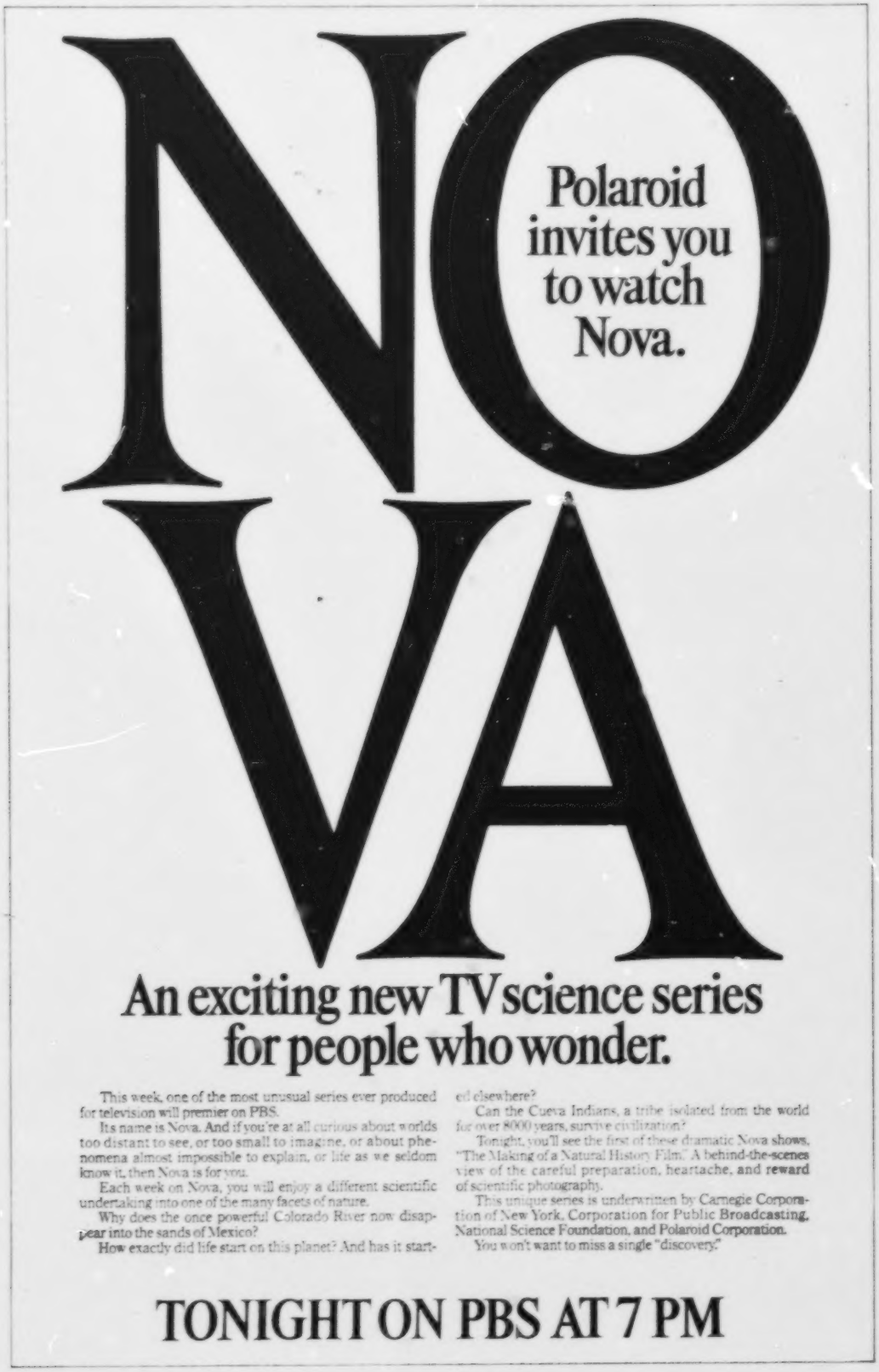
THE NEW YORK TIMES
March 3, 1974


NOVA
Polaroid invites you to watch Nova.
An exciting new TV science series for people who wonder.
This week, one of the most unusual series ever produced for television will premier on PBS.
Its name is Nova. And if you're at all curious about worlds too distant to see, or too small to imagine, or about phenomena almost impossible to explain, or life as we seldom know it, then Nova is for you.
Each week on Nova, you will enjoy a different scientific undertaking into one of the many facets of nature.
Why does the once powerful Colorado River now disappear into the sands of Mexico?
How exactly did life start on this planet? And has it started elsewhere?
Can the Cueva Indians, a tribe isolated from the world for over 8000 years, survive civilization?
Tonight, you'll see the first of these dramatic Nova shows, "The Making of a Natural History Film." A behind-the-scenes view of the careful preparation, heartache, and reward of scientific photography.
This unique series is underwritten by Carnegie Corporation of New York, Corporation for Public Broadcasting, National Science Foundation, and Polaroid Corporation.
You won't want to miss a single "discovery."
TONIGHT ON PBS AT 7 PM

THE WASHINGTON POST
March 7, 1974

'The Making of a Natural History Film'

By Jean M. White

One case where the invasion of privacy is justified (although the spiny stickleback may not agree) is "The Making of a Natural History Film," to be seen at 10 tonight on Channel 26 (WETA).

The stickleback might protest because it is his private world that is being invaded. The fish has a marvellous courtship and great fun with lovemaking. The male loves a well-rounded, big fat female swollen with fish eggs and resists the blandishments of any unloaded female. The female stickleback is choosy in her own way, going mad over a male with bright red fins.

The private world of the stickleback is the entrancing highlight on the hour-long program inaugurating the seven-part Nova series of "science adventures for curious grownups." You need only be curious, not a scientist, to be fascinated. And you really don't have to be grownup, for a 10-year-old will find excitment in the science documentaries.

The series, to be seen weekly on Thursdays, will solve a natural puzzle in "Where Does the Colorado Go?" on March 14. The Colorado once flowed into the ocean like any normal river, but now sinks stagnant into the desert 20 miles inland. The third in the series will feature "Whales, Dolphins and Men," a tale funny with the antics of the dolphins and whales and sad because of how badly man treats the nearly extinct whale.

Other Nova programs will cover "The Search for Life" if it exists outside this planet, following preparations to set a Viking lander on Mars in July, 1976; "The Last of the Cuiva," the South American Indian tribe that still lives in primitive style; the discovery of

Preview

anesthesia, and the crab nebula.

The stickleback fish is not a particularly attractive hero for tonight's premiere. But he turns out to be more than just another poor fish as you follow his private life and love. You root for the stickleback father to mate, fertilize the eggs and survive natural enemies such as the predator pike.

The earlier part of the hour, before the stickleback swims into view, introduces some of the incredible tricks used by nature photographers to get pictures of such things as a woodwasp extruding eggs into bark and the heartbeat of a chick embryo.

We see a frog egg exploding, in time-lapse photography that speeds up 15-minute action into three seconds. We meet the animals of the photographic menagerie, including Edgar the Ferret, who must be taken for walks; Albert the Owl, who is fed minced ham with cat fur for roughage, and the bat who is put in the refrig to hibernate.

But the star is the ugly, lovable 10-spine stickleback, who works busily to build a tunnel of love, shoring up the sand with fish glue. Then, he wiggles through to see the tunnel is clear. Now he is ready to look for an attractively fat mate, court her with zigs, zags and spirals, and then point her to his tunnel.

He helps push her swollen figure through the opening while she lays about a hundred eggs. Then he filizing the eggs with sperm.

The final closeups are startling — inside the stickleback's eyes, we are told and shown, are hundreds of writhing parasites. This is the way the stickleback sees outside his world, through hundreds of harmless, moving shapes.

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The New York Times
March 24, 1974

Washoe, a chimp that talks sign language and plays with a kittenish friend, stars in an upcoming segment of "Nova" on Channel 13

"Even a troubled public television gives us something 'special' to think about"

Public TV, or Vive la Difference!

By CYCLOPS

IF you were wondering why the networks stuck so many "specials" in your eye this month, it's because they wanted to beat the deadline for Emmy Award nominations. This saturation bombing of the optic tract happens every March, helping to obscure the fact that reruns have begun, and there is nothing to which the slob-voyeur can look forward except Henry Aaron and public television.

Ah, public television. You will also notice that during the months of April and May, TV reviewers will devote an inordinate amount of space to programs on public television. The networks are hibernating, chewing the fat in their brain cavities. TV reviewers need moving objects on which to fix our telescopic sights. Motion of some sort is usually to be expected on the public channel, in or out of season.

And motion of some sort there is, although not as much of it as there used to be. This is not the place for a rerun of public TV's many troubles —budget cuts, political interference, a bureaucratic membrane all of whose cells seemed

Shows like 'Nova' and 'Upstairs, Downstairs' put public television in a programing class by itself

simultaneously to go berserk—but those troubles did delay the start of the public TV season and have curtailed its length. There are fewer new programs, and very little political daring. We lost Elizabeth Drew's relentless interviews—and The New Yorker gained a valuable correspondent as a consequence. We will probably lose "Black Journal"—and, as a consequence, lose an invaluable training ground for black producers and directors, many of whom graduated from the program to Hollywood and the commercial networks.

Nevertheless, public TV's report card this year is still going to look better than, say ABC's. For example, "Upstairs, Downstairs," even if it is a BBC import, is enthralling—an open-ended novel with evolving characters and superb acting. Somebody at PBS should stick his head in an electric pencil-sharpener for having decided to omit six episodes because they were in black and white instead of color. Damn it, we watched "The Forsyte Saga" to the bitter end exclusively in black and white. However, "Upstairs, Downstairs" is in its fourth year in England, and PBS has purchased another 13 episodes, and Rose, I'm told, will marry somebody we haven't yet met.

"Theater in America" is about as reliable as Off Off Broadway—you never know when you're going to be amused, abused, engrossed or offended—but it seems to me more adventuresome by half than the commercial networ. addiction to old dramatic warhorses with big name actors uneasily in the saddle. (The network attitude reduces itself to telling us, Look, buddy, this is officially sanctioned cul- (Continued on Page 19)

Public TV!

(Continued from Page 1)

ture with a capital "C," plus bufflo box office as sweetener: take it, it's good for you.)

"Religious America" goes with mike and camera into the byways of the fundamentalist and millennial mentalities; I am filled with qualm, but the strange is made slightly more familiar. There have been a dozen documentaries as good as anything on "60 Minutes," blessed with the leisure to stay longer and probe deeper in the situation. The Bills Buckley and Moyers are nice to have around. And public television is the only place on the dial where our children are treated with as much respect as we would like to be treated ourselves.

Finally, there is "Nova," a new weekly hour-long series on public TV about science. "Nova" will run another eight weeks on Sunday nights. It is not about the sort of science we see on commercial networks, which is a science of Kodak snapshots: see the Venus fly' trap sing along with Disney; the zookeeper sky-dive on herds of caribou; the famous athlete skewer a marlin; Jacques Cousteau aggrandize himself; the winsome child weep on the brow of a tiger cub cute enough to make you want to guzzle Similac. "Nova's" science is about what makes the world tick, and what makes scientists themselves tick.

Half the programs were produced by the BBC, the other half by WGBH in Boston. We see how a team of British scientists investigate the mating behavior of the stickleback fish, even how they get a camera into the stickleback's eye to see the parasites swimming in the lens. We are instructed in the death of the Colorado River, at the hands of engineers. We tune in on whales and dolphins; look for life on Mars; find Indians in South America who had never seen a white man before and regretted it afterward; learn the story of the people who discovered anesthesia (with scientists, instead of actors, playing scientists); listen to the "tick" of the Crab Nebula (an exploded star becomes an astronomical "clock"); figure out how birds navigate; brood about medical experiments on human beings, "talk" to a chimp in sign language; argue with Darwin via the midwife toad; fuse the atoms in sea water to create energy; and try to solve the 800-year-old mystery of why the pueblo-building Anasazi Indians disappeared from the American Southwest.

Splendid programs, with dignity and a respect for inconvenient details and the drama of detective work and, above all, intelligent questions. Science, religion, theater, politics and Edwardian huggermugger . . . even a troubled public television will give us something "special" to think about long after Bad Henry hits his 715th home run and Gerald Ford becomes Poohah of the United States.

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THE INDIANAPOLIS NEWS
March 11, 1974

It Took A Lot Of Work To Steal A Major River

By RICHARD K. SHULL

Back in 1900 the first sluice gate was opened along the Colorado River, starting the biggest disappearing act of the century.

Now, after three-quarters of a century of man's "improving," the mighty Colorado which carved the Grand Canyon, peters out as the effluent of someone's drainage ditch. It no longer gets where it was going.

And of all things a desalinization plant is being built down near the Mexican border to reduce the salt in the water that had started as snow in the Colorado Rockies.

So now that the Colorado has disappeared, what's next? Well, the Bureau of Reclamation is thinking about a grand plan on a really grand scale to divert the rivers of the Canadian Northwest down across the continent and use the trench between the main ridges of the Rockies as the biggest, grandest, best reservoir ever.

Shull

All this talk is, of course, completely out of sync with the times. Ecology and environment were concerns of other years, back before the energy crisis and the current national mania to keep those internal combustion engines running and light bulbs lighting at all costs.

But, with scheduling what it is in television, the Public Broadcasting Service network already had an environmental series titled "Nova" on the schedule before the Yom Kippur war or, for that matter, before most people were even aware there was a Peabody Coal Co. and coal under Montana.

So last night "Nova" made its appearance on PBS, via WFYI here, with an hour titled "Where Did the Colorado Go?"

And it was a classic case history of the chain reaction that occurs when man leaps in before carefully looking over the problem.

That original sluice gate back in 1900 triggered thousands of mixed blessings throughout the water-starved Southwest. The river was diverted into a new course in 1905. Then came dams and dams to feed dams and dams to control the water feeding the dams feeding the dams.

Southern California prospered with hydroelectric power and abudant water for cities and water to irrigate desert valleys into lush garden centers.

But now nature is calling in her due bills. Plants in the irrigated valleys all along the Colorado consume the fresh water and leave the mineral content in the ground. Salt has accumulated in the garden lands and the farmers' answer has been to use more water to flush the soil, rinsing the salt back into the river to send it down on the next guy.

By the time the water gets to the Mexican farms, as one expert put it, "the saline content is catastrophic."

Meanwhile, away upstream the new Glen Canyon Dam to hold back water before it gets to Hoover Dam has some of the makings of a fiasco.

Its reservoir, Lake Powell, is on porous Navajo sandstone that is slurping up the water at a fierce rate. The dry desert air reclaims 5½ vertical feet of water a year off the top of the lake through evaporation.

Between the sandstone and the evaporation, the experts reckon about 10 per cent of the Colorado River is lost there behind Glen Canyon Dam.

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THE PORTLAND OREGONIAN

Science programs will be interesting

By FRANCIS MURPHY
of The Oregonian staff

AT A TIME when most television shows have slipped into repeats, KOAP-TV has started one of the year's most interesting series, a show by the unlikely name of Nova. Billed as "science adventures for curious grownups," Nova combines high production values with intellectual curiosity to bring viewers an absorbing weekly hour-long show. The 13-week series is shown at an unfortunate time, 8:30 p.m. Sundays, in competition with Nielsen favorites such as Columbo, Mannix and the ABC Sunday Night Movie. The titles are unimaginative, seeming to indicate standard classroom lectures.

LINDSEY WAGNER
"The Bionic Woman," World Premiere, KOAP-TV, 8 p.m.

But last Sunday's show, "The Search For Life," covered a fascinating range of subjects. How did life originate on earth? Does life exist outside this planet?

The show turned back earth's time clock by 4½ billion years, showed scientists working through rock formations to prove theories about the origin of life.

The program presented the first films showing the Viking Lander, which will land on Mars in July, 1976, and illustrated the means by which it will prove or disprove the existence of life on the planet.

If life exists on Mars, it will give a big boost to theorists who believe there must be intelligent beings in other solar systems.

Next week, Nova will examine "The Last of the Cuiva," a group of South American Indians who are being killed off by cattle ranchers.

British film producer Brian Moser spent a year with the Cuiva in Colombia. "One story our film does not tell," he said, "is how we trailed for miles through snake-infested, mosquito-ridden jungle swamps, with tarantula spiders and vampire bats swooping on us at night..."

Other Nova films will include "Strange Sleep," the story of the discovery of anesthesia, on April 7; "The Crab Nebula," created by the explosion of a star that the Chinese recorded in 1054, on April 14; "Bird Brain, the Mystery of Bird Migration," on April 21; "Fusion, the Energy of Progress," on May 19, and "The Mystery of the Anasazi," the Indians in the American southwest who vanished about 1300.

Nova is financed by $1.1 million from the Carnegie Corporation of New York, the Corporation for Public Broadcasting, the National Science Foundation and the Polaroid Corporation.

This is education television at its finest. It's a worthy competitor for Columbo.

RADIO TIMES
February 23, 1974

BBC2 Monday tv

'After my years of enforced celibacy on television, I can find sex appeal in almost anything – even a rabbit!' Intrepid 'Brother' Nimmo goes in search of sex appeal and more. Just a Nimmo: *8.50*

8.50 *Colour*
Just a Nimmo
with **Derek Nimmo**
This week Derek traces a random path through the history of sex appeal with the help of a Gaiety Girl, the most successful British pin-up of the 50s, the writer of *The Seven Year Itch*, and – in a visit to London's Playboy Club – the Bunny of the Year
Ruby Miller
Diana Dors
George Axelrod
Fleur (Bunny of the Year)

Script MIKE PENTHOUSE, JEREMY MILLINS
Designer STELLA MORAY
Producer VERNON LAWRENCE
(Derek Nimmo is in 'Why Not Stay for Breakfast?' at the Apollo Theatre, London)

9.25 *Colour*
Second City Firsts
A season of six original plays from Birmingham
2. **Girl**
by JAMES ROBSON
Jackie is leaving the Army. While waiting for the car she re-encounters Corporal Harvey, her previous lover . . .

Harvey ..... SYRA FRANCES
Jackie ..... ALISON STEADMAN
Maggie ..... STELLA MORAY
Bailey ..... EILEEN MCCALLUM

Script editor TARA PREM
Designer MILES LEE
Producer JOHN HEYER
Director PETER SELL

10.0 *Colour*
Election Broadcast
on behalf of the
Labour Party
(Details as BBC1)

10.10 *Colour*
Horizon
Where Did the Colorado Go?
The giant Colorado river runs through some of the world's most spectacular scenery: from its source in the Rocky Mountains through the Grand Canyon and the colourful sands of the Painted Desert towards its original outlet in the Gulf of California. But the Colorado no longer reaches the sea. Tamed into a mere trickle for the sake of illuminating Los Angeles, it finally sinks into the sands of the Mexican desert.
The Colorado's recent history of irrigation schemes, hydro-electric schemes and dams built in the wrong place show what mismanagement can do to any river in any part of the world.
Narrator PAUL VAUGHAN

Editor BRUCE NORMAN
Producer SIMON CAMPBELL JONES
(Repeated next Sunday afternoon)

11.0 *Colour*
Midweek Special and Election 74

11.45 *Colour*
Open Door
A weekly programme made by people with something to say.
The British Association of Retired Persons present a discussion on some problems of retirement.
The Society for the Rescue of Destitute Animals was started in Manchester 21 years ago and cares for animals abandoned by their owners.

12.30 am Closedown

PITTSBURGH POST-GAZETTE
March 5, 1974

ON THE AIR

Win Fanning

Science Series Intriguing

A NEW series of science "adventures" under the blanket title "Nova" made its debut last night on the public network (Channel 13 here). The premiere program, about the making of a natural history film, was produced in England by the BBC. This show was not available for previewing, but the second entry, to air next Monday from 8 to 9 p.m., was screened recently at WQED-TV and proved fascinating. Its subtitle is "Where Did the Colorado Go?" and it was, of course, produced and filmed in this country.

The intriguing question posed by this title underscores the purpose of the series as a whole, to provide the adult viewer, whether a science buff or just intellectually curious, a chance "to share the excitement of thinking along with a brilliant mind."

"Colorado" begins with a simple, if shocking statement: "The Colorado River used to flow into the ocean, like any good river should. Until about 1939. Now, this once-mighty river sinks stagnant into the desert almost 20 miles inland from the sea. We now know the effects of our technological 'improvements.'"

* * *

WHAT FOLLOWS is an almost incredible recital of man's near fatal tinkering with nature and the belated efforts now under way to undo years of engineering blunders. Told in a logical, straightforward manner, the mystery of the aborted river is revealed by scientists and engineers ranging in specialties from geologists and hydrologists to design and construction experts.

At the root of the problem is an enormous miscalculation prior to the building of Hoover Dam — that the flow of the Colorado averaged twice what it actually is.

The studies of this flow undertaken recently reveal that the original calculation was based on a short period of abnormal rainfall and runoff of melted snow when, obviously, a more comprehensive study should have been initiated. Changes in rainfall can be easily determined for a period of many years by tree-bore samples — as is demonstrated in the program.

* * *

FOR YEARS, before the present crisis situation brought about a far-reaching program aimed at reversing the process, dams for hydroelectric power, for irrigation, for water storage and for control of the water flow from previously built dams steadily reduced the available water, through various diversions of the main stream and its tributaries and the creation of huge lakes with their attendant water loss through evaporation.

During the hour the experts involved are shown at work and given an opportunity to discuss their progress, or the lack of it, in the face of continuing demands for yet more water for the expanding city of Los Angeles (which has none of its own) and for irrigation.

In future weeks the series will tackle such subjects as "Whales, Dolphins and Men," "The Search for Life," "The Last of the Cuiva" (a South American Indian tribe), "The Discovery of Anesthesia" (a working title) and "The Crab Nebula" (a nebula in the constellation Taurus).

* * *

MORE BRIEFLY: The warehouse for Channel 13's "Great TV Auction" was officially opened for business yesterday. The weekday hours are 10 a.m. to 4 p.m. For additional information call the station (WQED-TV) and ask for the auction office. One unusual item already on hand is a 19th century English theater box office. This is an oak kiosk, complete with door and ivory lettering to designate stalls, dress circle, balcony, etc.

"Police Story" has been renewed for another series of 22 episodes, one more than scheduled during the present season on NBC. Oddly, this is the only hour-long dramatic anthology stanza in recent years to go beyond its first season.

The latest ARB ratings, for the week ending Feb. 12, place 13 of the news shows telecast by Channel 2 in the top 25 in the Pittsburgh area. Seven of these are the local 6 p.m. news; two are the 7 p.m. program; and four are the Walter Cronkite CBS evening report. "All In the Family" still tops the list, with Sonny and Cher, "MASH," Mary Tyler Moore, "The Waltons" and Bob Newhart following in that order.

* * *

STARTING TODAY at 6 a.m. and continuing until 6 p.m., WWSW here and WCAU in Philadelphia will conduct a poll of Democratic party members among their listeners to determine their preference between Mayor Flaherty and Herbert Denenberg for the party's candidate for the U.S. Senate. The poll will be undertaken again in about a month and again one week before the primary.

THE WASHINGTON STAR-NEWS

Making a Science Film

By Frank Getlein
Star-News Staff Writer

"NOVA," the new science series on WETA 26, follows, in its first installment, tonight at 10, the general pattern of Francois Truffaut's recent hit, "Day For Night."

Like the Truffaut, "NOVA" tonight is a movie about making a movie.

The principal difference is that the characters in "NOVA'S" movie-within-a-movie are more sympathetic and more real than their Truffautian counterparts and the movie being made is more rewarding in itself.

Tonight's title is, "The Making of a Natural History Film." It and the film it records being made are both the product of a talented group of British scientists who have become movie makers in science.

TONIGHT'S EPISODE maintains a fine balance between the problems of making science films and the life of the subject, the stickleback fish.

The stick
lot more interesting and attractive than Jean-Pierre Leaud, Truffaut's perennial hero.

We see and are made to understand the substantial problems involved in trying to film significant events in the life of a fish only a few inches long. As preparation, we watch the crew solve related problems having to do with insects, birds and small animals. The ingenuity of the solutions arrived at and the sheer patience of their application are equally formidable.

In one sequence, 15 minutes of real time are filmed to produce three seconds of screen time. The proportion — 900 to one — is extremely high, even for regular movies.

The stickleback is found — by the young son of one of the movie makers — in a nearby marshy stream. This is not, however, a movie made on location. It is a studio film, the set is a fish tank, a large size domestic aquarium in which the conditions of life along a river bed are carefully simulated. Given the flow of the stickleback is happy enough to perform.

We watch him laboriously construct a trench in the bottom, fill it with weeds and prepare for courtship. This consists of turning parts of himself a bright red, thus attracting passing female sticklebacks round with eggs. Luring one into the nest, the male titillates her tail until she releases the eggs. He then hovers over the eggs releasing sperm to fecundate them in a performance rather more realistic than Marlon Brando's tango.

Produced by the Boston station for PBS, "NOVA" was financed by grants from the Carnegie Corporation, the Corporation for Public Broadcasting, the National Science Foundation and Polaroid Corporation.

LATER, LOCATION shots place the stickleback in his authentic environment and a dangerous one it is, with larger fish, chiefly the pike, always on the lookout for a tasty morsel like the stickleback.

Meanwhile, however, as with the Truffaut, our attention has been successfully engaged by the enterprise of making a movie. We have learned a great deal about that enterprise and a great deal about the stickleback. In the process we have developed an affection for both.

Although the science series opens with this superb British production and although it comes into the Public Broadcasting Service from Boston's WGBH, the source of the excellent BBC productions of Masterpiece Theater, "NOVA" is not another example of British cultural imperialism.

Next week's production, like most in the series, is American in origin. "Where Did the Colorado Go?" investigates how well intentioned people, scientists among them, managed to murder a river and how it might be brought back to life.

The other programs will show the dolphins and whales and their curious, potentially suicidal, liking for human beings, the history and present status of scientific search for the origins of life, a dwindling primitive tribe upcountry in Columbia, the discovery of anesthesia, and the astronomically distant Crab Nebula, the gases of which are still expanding after its explosion 920 years ago.

BOSTON HERALD-AMERICAN
April 19, 1974

Anthony La Camera

SPEAKING OF EMMY awards (cf. paragraph three), it might be a good idea for at least one to be handed out in the education-information category to the splendid PBS—Channel 2 series, Nova. This exceptional package of true science adventures comes up this Sunday at 7:30 p. m. with a fascinating hour titled "Bird Brain — The Mystery of Bird Navigation." It will be repeated on Monday at 10 p. m. and the following Saturday at 2 p. m.

"Bird Brain" is a veritable detective story, examining in interesting detail the wonderful mystery of how our feathered friends can travel thousands of miles to and from the same winter and summer homes with remarkable navigational skill. It takes us to various research projects in this country and in Europe, where helicopters, airplanes, computers, magnetic electrodes, radar and even contact lenses are being utilized to find answers to the uncanny techniques of the traveling birds. Some of the answers, at least, are emerging.

The photography for "Bird Brain" was done by Franco Romagnoli, a film-maker as well as Italian culinary artist, and some scenes for the internationally-syndicated program were filmed in Massachusetts, if you'll pardon the provincial touch.

TV GUIDE
March 23-29, 1974

By Carl Sagan

Long before there were men on earth, a brilliant, ruddy point of light graced the night sky. Later, our ancestors were puzzled and fascinated by it, and named it—probably because of its blood-red color—after Mars, the god of war. After the invention of the pseudo science of astrology, it was imagined that Mars influenced in some profound way the lives and destinies of human beings. There is no evidence for such astrological influences. Nevertheless, Mars *is* about to alter human history in a way never dreamed of by the founders of astrology: we are going there.

The first Mars landings, scheduled for the next two years, will be examined this Sunday (March 24) on "The Search for Life," an episode of PBS's *Nova* series.

After the invention of the telescope, it became clear that Mars was a world similar to the earth. The planet appears to the unaided eye as a point of light because it lies so far away—35 million miles at closest approach. Yet through even a smallish telescope it is clear that Mars has an atmosphere, clouds, surface markings and polar caps. Hence it was not hard for early astronomers to imagine life there. And despite fluctuations in the tide of informed opinion, it still seems quite possible that Mars harbors life.

There is more carbon dioxide (which plants use for photosynthesis) in the Martian atmosphere than in our own. Daytime temperatures at the equator are comfortable even by human standards. There is sunlight. There is a little oxygen in the thin atmosphere. There seem to be immense quantities of water frozen in the polar caps and the subsurface ice, and locked in the minerals of the surface.

If there is a little liquid water in the ground of Mars, even some varieties of earthly microbes could survive, grow and proliferate—though unprotected human beings would die from the nighttime cold, the intense ultraviolet rays from the sun, and the scarcity of oxygen and liquid water. If life once got started on Mars, there seems to be no reason why it could not flourish there today.

On the other hand, we have not the slightest evidence that Mars is inhabited either by microbes or by larger creatures. The American spacecraft Mariner 9 was the first vehicle to orbit another planet. It returned information about Mars for a full year beginning in September 1971.

Mariner 9 showed that the fabled canals of Mars, once imagined to be an irrigation network constructed by intelligent Martians, did not exist. (A few "canals" turn out to be natural formations, but most are illusory—errors of the eye and mind.) It demonstrated that the tiny moons of Mars, which some had imagined to be artificial satellites launched by an ancient Martian civilization, were entirely natural objects like our own much larger moon. Mariner 9 also found that the changes in surface markings, which for a hundred years had been attributed to the seasonal growth and decay of Martian vegetation, were instead due to fierce winds sweeping bright dust onto and off the surface. And for the first time, Mariner 9 took enough finely detailed pictures to show that the kinds of urban and agricultural reworking of the ground—such as those that show up in high-resolution pictures of the earth from space—do not exist on Mars.

These results have been disappointing to some. But they illustrated only the danger of jumping to quick conclusions on the basis of poor, earth-based observations. In the minds of many scientists, Mariner 9 greatly improved the chances of life on Mars, as the television cameras uncovered an array of thousands of curved channels, many with tributaries, cut into the Martian crust. Many of these channels could be produced only by running water. There is no running water on Mars today because the atmosphere is too thin. The channels therefore point to an earlier time in the history of the planet when the atmosphere was thicker, the temperature warmer and there was abundant liquid water on its surface. These are conditions much more earthlike than the present environment of Mars, and they make it possible to imagine that Mars now—or, at least at one time—harbored organisms in some respects like those on earth.

If there is life on Mars, we may know about it soon. One Soviet spacecraft is now orbiting Mars, and two more seem intended to land and to transmit the first television pictures from the surface of the red planet.

A scientifically more elaborate mission to Mars is planned by the United States in the summer of 1976, in commemoration of the American Bicentennial. The mission is called Viking. Two Viking orbiters and two Viking landers will measure the chemistry of the Martian atmosphere and surface, map the planet by orbital television (with finer detail than Mariner 9), search for Mars quakes, and send back for the earthly evening news programs a daily weather report from Mars.

But Viking will also look for life. Each lander has a mechanical hand and arm which will procure samples of the Martian surface and insert the samples into experimental packages designed to test for Martian microbes. And each has also two television cameras to scan the red landscape and see if anybody interesting walks by.

Mars varies a good deal from place to place, just as the earth does. These first Soviet and American landers on Mars may fail to find life because they have not landed in the right place or have not asked the right questions. But for the first time in history we are searching actively for life on a near-by planet. If, after a thorough study of Mars, the planet proves lifeless, we will have learned something about the uniqueness of our tiny blue world, the earth. We will have learned that even on planets that seem able to support life, life does not always begin or always survive.

If we do find life on Mars, we will have hit the cosmic jackpot. The biological perspectives we will gain promise significant practical benefits for mankind. The sense of wonder and spirit of adventure that have gone out of much of modern life will be rekindled. And we will know that on countless other worlds, orbiting the 200 billion other stars of our Milky Way, there must be other beings, some more backward, but others undoubtedly more advanced, than we.

Carl Sagan, who appears in "The Search for Life," is director of the Laboratory of Planetary Studies at Cornell University and author of "The Cosmic Connection."

continued

SCIENCE NEWS Vol. 105
March 2, 1974

NOVA TV SERIES: A REVIEW

A new television science series, NOVA, makes its debut on public television Sunday, March 3, at 7:30 p.m., EDT. Billed as "Science Adventures for Curious Grownups," a preview showing in Washington, sponsored by the American Association for the Advancement of Science and WGBH-TV, Boston, which produced the series, presented the first two programs in the series. Both were well done visually and interspersed at some times with some magnificent, even breathtaking, film moments.

The first program, "The Making of the Natural History Film," was produced in Great Britain by the famous BBC Features Group, which has distinguished itself by a wide array of scientific and technological films. The emphasis was on the craft of cinematography more than science. There was a fascinating pictorial story of the ingenious and unnatural ways in which natural history films have to be made under artificial studio conditions. The viewer is presented with the enlarged look at the diminutive world of insect larvae, sticklebacks laying their eggs, developing embryos, and basic life functions at levels too small to see with the ordinary eye. How these views are accomplished by using macrophotography, which fills the screen with small creatures, microphotography, which substitutes the microscope for the naked eye, time-lapse photography, which speeds up movement that cannot be seen, high-speed cinematography, which slows down movement, and various optical techniques such as the dark field, was the chief subject of the film. It showed a veritable workshop of ingenuity where filmmakers can capture, as if in nature, routines like the courtship and laying of eggs of the stickleback and the wood wasp laying her eggs from the viewpoint of an observer inside the food. The film craft is excellent, and it has already won the Prix Italia and an International Emmy award. Taken for itself it is an interesting television show.

Examined in view of the objectives of the entire NOVA series, which is jointly funded by a grant from the Carnegie Corp. of New York, the Corporation for Public Broadcasting, the National Science Foundation, and the Polaroid Corp., in association with advice and cooperation of the AAAS, the first program raises at least one question.

A major objective of the series is to meet the public need for understanding science and technology and its consequences to man's current life and condition. This first program, while excellent as a film, may do little to answer that question. In fact, for the nonscientist and citizen, it could raise a big question as to how all this refinement of technology and dramatic film skill is actually related to the lives of people. Science is so compelling to those who participate in it and its expanding technology that it is easy to leave the viewer and the citizen out even when there is a fantastic attempt to bring him in through awe and mystery. This film didn't answer the issue of what it means to me.

The second in the series, scheduled to be presented March 10, "Where Did the Colorado Go?," is a much more exciting presentation for Americans. It tells a dramatic story of what 20th Century technology has done to the Colorado River. A skillful and sensitive production crew shows the story of the destruction of a river and its symptoms of decay, evaporation, erosion, vegetation transition, and decreasing quality of water. This is well worth the time of every television viewer who wants to have a better understanding of what his age has done to the natural world. WGBH-TV, which produced and collected the film series, has initiated for American viewers an additional thrust for science on television. One will hope that succeeding programs in the series reflect even more effectively that people are hungry for scientific information that is not just facts but that places in context what it means to human existence in the 20th Century. Titles of other special programs include, "An Exploration of Whales, Dolphins and Men," "The Search for Life on Mars," and "The Last of the Cuiva," an Indian tribe being gradually destroyed in Colombia. Subsequent programs will explore the discovery of anesthesia through a dramatic reenactment of this fundamental discovery in medicine; the story of the discovery of the Crab Nebula, one of the most powerful sources of radio and x-rays in the sky. Also slated for special programs are bird navigation and the fascinating technology scientists use to solve the question of how birds navigate; and not to be missed will be the film story of Washoe the chimpanzee who has been taught to communicate with humans by using the American sign language.

All with an interest in science should watch your TV schedules for NOVA.

M. J. Sherburne

VARIETY
April 10, 1974

NOVA
(Strange Sleep)
Supplier: WGBH-TV Boston
Exec Producer: Michael Ambrosino
Producer: J. Francis Gladstone
60 Mins., Sun., 7:30 p.m.
PBS

When the powers at the Corporation for Public Broadcasting made it known that they prefer shows in the arts and sciences to public affairs and shows with "library shelf" value to hard news, the public tv production centres scrambled to come up with projects to fulfill those preferences.

Among the results of the scramble has been a special series this year starring outstanding diseases. But, in television terms, the best result has come out of WGBH-TV Boston, which came up with "Nova," a wide-ranging series featuring local productions and BBC product that might be called variety-science.

Among "Nova" shows are "The Case of the Midwife Toad," "Are You Doing This for Me, Doctor, Or Am I Doing It for You?" "Whales, Dolphins and Men," "Where Did the Colorado Go?" and "Bird Brain, the Mystery of Bird Navigation." The reach for a good combination of education and entertainment is obvious in the titles, and from all indications "Nova" is making it.

Show Sunday (7) was a WGBH production, "Strange Sleep," the story of the men who revolutionized medicine in the 19th century by the discovery of anesthesia. The story, which is loaded with human tragedy and conflicts (none of the discoverers achieved either fame or riches), is unfolded here in dramatic narrative and features in the historic roles renowned doctors from the Boston area. Among the medical players are Dr. Oliver Cope, Harvard Medical School professor of surgery emeritus; Dr. Jerome Lettvin, professor in biology and electrical engineering at MIT; Dr. Edward Seldin, oral surgeon at Massachusetts General; and Dr. Stuart George, surgical resident at Beth Israel Hospital. All came off as firstrate amateur players, with a strong assist from the sometimes very painful dramatics of the narrative.

With its scope, "Nova" should be good for seasons to come. — *Bill*

BEST COPY AVAILABLE

THE BOSTON GLOBE
April 6, 1974

Boston doctors star in Ch. 2 medical film

DR. GRIFFIN, DR. COPE

DR. LETTVIN, DR. GEORGE

By Bruce McCabe
Globe Staff

One of the earlier sequences in "Strange Sleep," the story of the discovery of anesthesia which is one of the programs in the WGBH-TV (Channel 2) "Nova" series and which is to be shown at 7:30 p.m. tomorrow, shows a man having a leg amputated without benefit of anesthesia.

The year is 1840 and anesthesia has yet to be discovered. The patient is wheeled into an operating room at Massachusetts General Hospital and asked if he concurs with the amputation. He does. He is administered a mixture of opium and wine and is strapped to the table. A tourniquet is applied.

The patient's agonized screams begin with the surgeon's first cut and continue until the patient faints from trauma. Blood gushes forth. The surgeon, Dr. John Warren, a flinty, white-haired man, realizes he has only seconds to finish cutting before the patient dies of shock. He makes it. An assistant with a timepiece clocks the operation at a minute and 50 seconds. Some students watching from an amphitheater balcony applaud, save for one who is draped over a rail having fainted when the operation began.

The discovery of anesthesia was a messy, torturous process that left ruined lives and reputations in its wake. One of the key figures was Horace Wells, a Hartford, Conn., dentist who experimented with the use of nitrous oxide as a general anesthetic. On Feb. 21, 1848, Wells committed suicide in "The Tombs," the New York City jail. He had become addicted to anesthetic drugs and was convicted of throwing acid in a prostitute's face.

The dramatization of the story of the discovery of anesthesia in "Strange Sleep" is enhanced to a remarkable degree by the portrayal of such 19th Century figures as Warren and Wells and other key participants by actual doctors and other medical personnel from the Boston area, many from Massachusetts General and the Harvard Medical School. Warren, for instance is played by Dr. Oliver Cope, professor of surgery emeritus at Harvard Medical School, and Wells is played by D. Edward Seldin, oral surgeon at Massachusetts General and a clinical assistant in oral surgery at Harvard Dental School.

Although at least one viewer at a screening of the episode before scores of doctors, their families and friends at MIT the other night was surprised by the authenticity of the performances, J. Francis Gladstone, a producer, professed not to be.

"It's an old film tradition to use amateurs," Gladstone said. "It was done in Russia a long time ago and as recently as the 1950s in Italy with the 'neo-realistic' films."

Other performances to watch are those of Jerome Y. Lettvin, professor of communications physiology at MIT; Dr. Terrence Hayes, a graduate student in endodentics at the Boston University School of Graduate Dentistry; Dr. Martin Cameron, obstetric anesthesiologist at the Boston Hospital for Women; Dr. Stuart George, a surgical resident at Beth Israel Hospital, and Dr. John F. Griffin, an ophthamologist. Particularly flamboyant is Lettvin's characterization of a "self-appointed protessor" who demonstrates the use of laughing gas (nitrous oxide) at a pseudo-scientific demonstration.

A random survey of the amateur actors at the screening yielded a number of comments about how striking it is to see oneself performing in a film. No one said it is as painless as an operation with anesthesia.

DR. SMOCK

By George Lemont

BEST COPY AVAILABLE

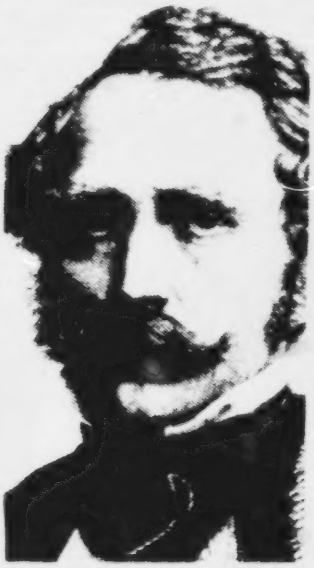
TOWNSMAN, Wellesley, Mass.
April 4, 1974

Dr. Morton Featured In Nova TV Series

Strange Sleep," a documentary about Dr. William Thomas Green Morton, will be telecast three times nationally by Channel 2 in its NOVA educational series. April 7, at 7:30 p.m., April 8, at 10:00 p.m., and April 13, at 6:00 p.m.

Dr. Morton was a town citizen who in 1846 was the first person to publicly demonstrate the use of ether as an anesthetic in general surgery.

Strange Sleep" is the dramatic account of Dr. Morton's success and failure that ended with his death at the age of 49, due to heartbreak and poverty, and resulted in his election to the Hall of Fame years later. Many other honors have been bestowed on him posthumously.



Dr. William Morton

In 1845, Dr. Morton bought a 50-acre farm in West Needham (now Wellesley) on part of which the Town Hall now stands. His home, "Etherton Cottage," was built on the hill where a plaque identifies the site. After completing experiments at the farm, he used ether in the practice of dentistry in Boston. Finally, on October 16, 1846, he was allowed to demonstrate the effectiveness of ether in surgery - at Massachusetts General Hospital.

"Gentlemen, this is no humbug!" exclaimed Dr. John Collins Warren, the surgeon who had just completed the delicate operation of removing a tumor from the patient's jaw. This now historic event took place in the operating amphitheater under the Bulfinch dome of MGH before an amazed assembly of physicians and medical students. Dr. Morton was 27 at that time. His biography by Dr. Nathan F. Rice was titled "The Trials of a Benefactor."

Personnel of Wellesley Historical Society assisted WGBH-TV for many weeks in the production of "Strange Sleep."

On the occasion of the 100th anniversary of the historic ether demonstration, **The Townsman** published a full page devoted to the memory of Dr. Morton, that was said by Massachusetts General Hospital to be the best coverage among the news media.

Dr. Morton applied for, and expected, a grant of $100,000 for his pioneer work in the field of anesthesia. With that expectation, he borrowed heavily until his creditors lost patience. They hung Dr. Morton in effigy from great buttonwood tree that once stood on the south side of Wellesley Square. Dr. Morton is said to have mingled with the crowd of spectators. The grant never was received.

M.S.U.

SCHENECTADY GAZETTE
March 30, 1974

Primitive Indians on Nova Film

When British film producer Brian Moser was making a film on South America, he came across a story in a local newspaper of the murder of 18 Cuiva Indians, massacred during a "celebration" to which they had been invited by white cattle ranchers, who mercilessly shot them down.

* * *

That story led Moser back to South America to film, "The Last of the Cuiva," one of a series of science adventures on WMHT-Channel 17's "Nova" to be broadcast Sunday, March 31, at 7:30 and Saturday, April 6, at 6.

The only way to find out what was happening to the Cuiva was to go and live as an Indian among them. It also meant that Moser had to find a camera crew who would be willing to live the life of primitive tribes, sleeping in string hammocks, wading waist-deep through jungle streams with camera equipment on their backs, paddling dugout canoes and shooting snakes. And not just for a week or two, but for a whole year.

Moser also recruited three groups of European and North American anthropologists who had already been virtually adopted into certain Indian tribes.

"One story our film does not tell," says Moser, "is how we trailed for miles through snake infested, mosquito-ridden jungles, with tarantula spiders and vampire bats swooping on us at night. Once we ran out of food. Even the Indians had nothing. They caught flying ants and fried them and they tasted rather like bacon, with a dash of pepper and a squeeze of lemon."

THE WALL STREET JOURNAL
April 12, 1974

The Midwife Toad And Crab Nebula

By Jerry E. Bishop

In 1054 A.D., a new star suddenly appeared in the constellation Taurus. For several weeks it shone so brightly it could be seen in broad daylight and then it began to fade, according to startled Chinese and Japanese astronomers of the time. Today, where the star once existed is a vast cloud of gas and dust, for what the oriental astronomers saw wasn't a new star but the incredibly violent death of an old star, a phenomenon called a supernova.

Supernovae had been seen before and have been seen since. But the remnant of the 1054 explosion has suddenly become one of the most fascinating objects in the sky. Called the Crab Nebula, this cloud of dust, which is still expanding at the rate of 800 miles a second, has been found to be one of the strongest sources of radio waves and X rays in the galaxy, a hint that at its center may be one of the most mysterious of all the stellar objects, a neutron star.

The story of the Crab Nebula and why it is of such interest to today's astronomers is the subject of this Sunday's "Nova" television series, the Public Broadcasting System's new science series. The series is being shown on most public broadcasting channels at 7:30 p.m. each Sunday.

Produced by WGBH in Boston, "Nova" is rapidly becoming one of the most versatile series of science programs found on television, public or commercial. Unlike the watery adventures of Jacques Cousteau or the natural-history bent of the National Geographic Specials, the "Nova" series is ranging across the whole spectrum of science.

Already it has explored why the Colorado River now ends in the desert, 25 miles short of its original mouth in the Gulf of California (a miscalculation of how much water flows down the river led to the building of too many dams). It also has probed the possibility of life in other parts of the universe and the near-disappearance of a gentle Indian tribe in the South American jungles.

Last Sunday, "Nova" reenacted the discovery of anesthesia by two Boston dentists, a well-done drama made all the more fascinating by the fact the actors were real-life physicians, surgeons and scientists who unquestionably performed far better than professional actors.

A brief glimpse at some of the future programs indicates "Nova" intends to keep up this diversity. It will explore the mystery of how migrating birds navigate and the story of a chimpanzee that can communicate in sentences. In May, the series plans again to delve into scientific history by re-enacting "The Case of the Midwife Toad," a scientific hoax of the 1920s that threatened the foundations of Darwinian evolution.

So far only one of the "Nova" programs has slipped from the series' efforts to live up to its billing as "science adventures for curious grownups." The third of the 13 programs is on "Whales, Dolphins and Men." As excellent as the production may be, any television viewer who has gone through Lloyd Bridges, Jacques Cousteau, "Flipper," and who is now being ballyhooed into seeing George C. Scott in "The Day of the Dolphin," may find another dolphin film almost too much to bear.

Later this month "Nova" will present a controversy that too long has been ignored on television—the ethics of human medical experiments. Medical ethics have come a long way since the grossly immoral experiments performed in Nazi Germany. But there are still experiments being undertaken of questionable ethics. There is the problem, for example, of whether prisoners truly volunteer for some of the dangerous experiments that have been carried out in the nation's prisons and who should give consent for experimentation on mentally-retarded children.

This program is aptly titled "Are You Doing This for Me, Doctor, or Am I Doing It for You?", alluding to the problem of whether the subject of a medical experiment is to benefit, directly or indirectly, from the risks he supposedly agrees to take (whether he truly knows the risks of the experiment is another, equally serious question). Considering the recent uproars over hepatitis experiments on mentally retarded children in New York and the exposure of the untreated syphilitic black men in Tuskegee, Ala., this program alone should mark the "Nova" series as exceptional television.

Science hasn't always fared well on television and medicine even less well. Too often such programs are either little more than a series of lectures interspersed with pictures of strange apparatuses or else they are travelogues where the adventures of the scientists or explorers overshadow the science.

One exception has been "The Killers," a series on medical research also appearing on public television. The other exception is the "Nova" series which is proving to be not only good science but good entertainment.

THE BOSTON GLOBE
March 3, 1974

Hooray for new science adventure series

By ROBERT A McLEAN

Man and his damn-fool notions about cheap electric power and irrigation made a short-fall river of the once-mighty Colorado, which now trickles and dies in a desert 20 miles from the sea.

The stickleback, a very small fish, and the whale, a very large mammal, are aquatic creatures which exist under incredible hardships, because of the whims of Man and Nature.

Like the Mohicans, South America's Cuiva Indians are dying as a tribe, and are being assisted into extinction by 20th-century "Cowboys" and their blazing guns.

These and other fascinating facts are "Nova," the new series of "science adventures for curious grownups," which premieres tonight on Ch. 2 at 7:30.

(A small hooray, in advance, for the series which is not just for curious kids and young folk.)

First of the hour-long shows, bearing the somewhat-unprepossessing title "The Making of a Natural History Film," actually is a look at the private life of the stickleback, elusive swimmer of country streams. A British scientific film-making team captured the poor fish in minute detail, and the documentary itself captured all kinds of foreign film awards.

Next Sunday "Nova" asks "Where Did The Colorado Go?" and then explains the environmental blunder made when dams were built at the mouth of the Colorado in the late 30s, to irrigate arid land, and to generate electricity. The project was based on a serious miscalculation of the flow of the river, which scientists believed was twice its actual volume.

Today the southern end of what once was a majestic waterway of commerce is nothing but a dribble of stagnant water, which disappears into the sand 20 miles inland. Engineers are still seeking ways to repair the damage, and their efforts will prevent future goofs.

Whales can sing (they probably favor the blues), and their wailings form the background music for the mind-boggling "Whales, Dolphins and Men," so anyone can be the judge. It's more than likely blues, because until only a few years ago the whale was near-extinct because of Man and his slaughter of the earth's largest mammal.

Whales "talk" to one another through hundreds of miles of ocean depths, and have wondrous healing powers — cuts in a whale's skin close quickly, leaving no scar tissue. Dolphins, of course, are intelligent, talkative and dextrous, with a penchant for clowning, providing the comic relief for this third in the series.

No laughing matter, the plight of the Cuiva Indians is more a matter of murder, as depicted in the grimmer passages from "The Last of The Cuiva." British film-makers spent a year in the aboriginal back country of Brazil, shooting what may be the last footage on this primitive tribe. While on location, the film crew came upon another group "shooting" the Cuiva — a group of white cattle ranchers who invited 20 Cuiva to a festival, then unmercifully gunned them down. This modern savagery, added to the relentless jungle and its natural killers, have reduced the Cuiva to a feeble remnant of a strong, hardy people.

Other "Nova" segments deal with the possibility of life on Mars, soon to be explored by an unmanned land probe, footage on the mysterious intergalactic Crab Nebula, and the discovery of anesthesia, a Boston-oriented medical landmark. ■

PRIMETIME
April 1974

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MAN HERE GOES FLYING AFTER BIRDS...

by Charles Walcott

(Nova this month devotes one program to the puzzling phenomenon of bird navigation. In "Bird Brain" you'll meet Prof. Charles Walcott, who has taken a rather direct approach to the question: he chases his winged quarry in a plane. What follows is excerpted with permission from AOPA Pilot, *the official magazine of the Aircraft Owners and Pilots Association.—Ed.)*

"Boston Approach, Twin Comanche Seven Five Four Six Yankee."

"Four Six Yankee, say your intentions."

"Four Six Yankee will be in your area for a while, following a homing pigeon."

Silence—a long silence. Finally:

"Four Six Yankee, advise leaving two thousand five hundred."

So it was, nearly 10 years ago, when we began studying the navigation of homing pigeons by following them in an airplane. Now, of course, Boston Approach knows us well and usually greets our calls with a cheery "Pigeon chasers cleared through the zone." They have even taught their computer to print "PIGEON" on the tag accompanying our radar return.

The problem that we are studying is how birds manage to find their way over long distances without charts, maps, omnis or ADFs. If you take a homing pigeon away from its loft and release it several hundred miles away at a place where it has never been before, it will circle a few times and then promptly fly home. The question that we would like to answer is, How does it know where home is?

Unlike a migratory bird, which has a general idea of going north in the spring or south in the fall, the pigeon has no idea ahead of time from which direction it will be released. Yet within a minute or two of becoming airborne, most pigeons are flying a course toward home. How do they do it? One obvious idea is to follow them and see what they do.

What was needed was some way to mark the pigeon so one could follow individuals, and it was the advent of the transistor that made pigeon-borne radio beacons a possibility. In 1962 Martin Michener, who was then a graduate student of Griffin's at Harvard, built a small transmitter that could be attached to the pigeon. I had passed my private pilot checkride, so our collaboration began.

Dr. Walcott is Associate Professor and Chairman, Dept. of Cellular and Comparative Biology, State University of New York, Stony Brook.

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Our first attempt at tracking was made on a bright, sunny day in early February. A Cessna 180 had been rigged with tracking antennas, a special receiver had been built and tested, extra colleagues had been recruited to release the pigeon and assist in tracking. In addition, the airplane had been fueled and placed in a hangar overnight to be ready for the great day. It was a cold night, however, and the heater in the hangar failed during the early morning hours, allowing the melted snow to freeze the hangar doors immovably shut!

Two weeks later, on the next sunny day, we tried again. The airplane worked, the pigeon flew, and the tracking system performed flawlessly—but, after flying less than a mile, the pigeon landed. From the air we pinpointed the location and circled the area. A couple of hours and at least 60 circles later, we decided that something must have happened to the pigeon, so we returned to Hanscom Field and set out to find the pigeon by car.

Since we knew almost exactly where the bird was from the air, finding the transmitter on the ground with a portable receiver was easy—the pigeon was sitting on the huge telemetry antennas of Lincoln Laboratory, which was surrounded by a high fence, guards and No Trespassing signs.

There was no chance of explaining to the pigeon with a well-placed snowball that it had picked a bad place to perch. So we waited—and waited—expecting at any moment to be accosted by the guards. Our radio beacons use less than a thousandth of a watt of power, but if the transmitter is actually sitting on your antenna it generates quite a signal!

Finally, the love of food and companionship was too much for the pigeon, and it took off. A mad dash for the airplane and we found the pigeon making a splendid course for home. But as it approached the loft, it turned to the south and sat for a second time—on the grounds of a mental hospital. Somehow it seemed wiser this time not to pursue the bird on the ground. We could imagine the reaction of the hospital staff to our explanation that we were looking for a lost pigeon with radio direction finding equipment.

But the whole system did work, and over the years we have followed many pigeons. The Cessna 180 was replaced by a Twin Comanche for following birds far out at sea. And the radio beacon has been greatly reduced in size.

What we have found is that pigeons can make remarkably straight courses home. They often stay within one or two miles of a perfectly straight course, over distances of 100 miles or more. They can return when released far out at sea on days with only four miles' visibility, under overcast skies and with varying crosswinds.

This year and last, we have been following pigeons whose eyes were covered by frosted contact lenses, so the birds could see only diffuse light—no landmarks. But even with this seemingly considerable handicap the pigeons showed accurate orientation towards home, though they did have great difficulty in finding the loft. Often they would come within a half mile, only to continue for 15 to 20 miles, turn and try another approach. Surprisingly, a few birds actually landed within a few hundred yards of the loft, and many others ended up sitting within a mile. Apparently, whatever navigation system the pigeons are using is astonishingly accurate, and does not depend on detailed visual information until the pigeon is very close to the loft.

Using the airplane, radio beacon and a portable receiver, we have so far recovered all the strayed birds. But the expressions on the faces of people who came to the door, when we asked if we could climb one of their trees to recover a pigeon, can be imagined.

NOVA
Sundays at 7:30 pm on 2, 44 & 57; repeated Mondays at 10 pm on 2, Saturdays at 6 pm on 2 & 57

April 7:

Strange Sleep

We may take surgery for granted today, but little more than a century ago people frequently died from things like appendicitis because doctors couldn't operate: the pain was certain to kill the patient. Yet the discovery of anesthesia, when it came, meant less the end of agony than the start of controversy; the long struggle to make anesthetic drugs acceptable marks one of the grimmer chapters in medical history. You'll see it all.

April 14:

The Crab Nebula

In 1054 AD, the Chinese recorded the explosion of a star so bright that it lit the daytime sky for weeks. It took centuries for astronomers to find that the Crab Nebula had been created from the cosmic debris of that same explosion; recently it's been learned that there's something in the Crab Nebula that ticks like a clock . . . and it's the greatest source of radio waves in outer space. There are a lot of unanswered questions about the Crab Nebula, and they all begin "how come?"

April 21:

Bird Brain.

As Prof. Walcott notes, we know *what* they do up there, but we still don't know exactly *why*.

April 28:

Are You Doing This For Me, Doctor, Or Am I Doing It For You?

An American doctor once injected twenty-two patients with live cancer cells without telling them what he was doing . . . as an experiment. Shocking? Sure. But only slightly less shocking (and much more routine) is the everyday experimenting that uses prisoners and mentally retarded children as guinea pigs. In the aftermath of the Nuremberg war trials, what (you may ask) goes on, anyway? What indeed? But it's *important* to experiment somehow on human subjects. . . .

Nova

You don't have to be a scientist to love *Nova*. You may even be one of those people who turns out at the very thought of a scientific anything. But if you love mysteries, unraveling a hard *puzzle*, the excitement of thinking along with a brilliant mind ——then chances are this is the program for you!

The First Signs Of Washoe . . . Washoe has a vocabulary of over 150 words and she uses it with a frankness that lets you know just exactly what she thinks about something — or you. Washoe, a chimpanzee, was brought up by Professor Allen Gardner and Dr. Trixie Gardner in their home. They taught her American Sign Language, the language of the deaf, through which she is able to "talk" to the Gardners.

The Case Of The Midwife Toad . . . In 1926 Paul Kammerer, an Austrian biologist, shot himself in the head. His evolutionary experiments contradicted Darwin and he was accused of forging his experimental results. His death was the end of the most sensational and bitter scientific controversy of the century. Until now. This program reopens the investigation and present evidence indicates that Kammerer was "framed."

Fusion — The Energy Of Progress . . . Fusion is the putting together of atoms, it's the opposite of fission, which is the splitting of atoms. A fusion reactor would be a controlled H-bomb, as a fission reactor is a controlled A-bomb. But, a fusion reactor is almost completely safe and would allow us an unlimited supply of usable energy.

The Mystery Of Anasazi . . . The Anasazi people were the first "urban" dwellers on the North American continent. They built massive apartment houses of pueblos, some of which housed hundreds of people. Their architecture is better than anything that was built in Europe during the same period. Why did they disappear?

Discover Nova . . . "Washoe," May 5 . . . "Midwife Toad," May 12 . . . "Energy of Progress," May 19 . . . "Mystery Of Anasazi," May 26 . . . every Sunday evening at 11:00 p.m.

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"The First Signs Of Washoe"

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TV GUIDE

May 4, 1974

Chimpanzees

They're smart—
but not smart enough

By Isaac Asimov

[redacted]

[On Sunday, May 5, NBC's Nova series shows some experiments in teaching chimpanzees to communicate by sign language. To supplement your viewing of the program, we are providing this background information. See Sports and Specials columns for time and channels.—Ed.]

If a hundred million monkeys were to pound at typewriters long enough, they would eventually write all the books in the British Museum.

This often-repeated remark is an expression of the power of random events given sufficient time and an important power it is since it is what produced man out of the chemical soup of the primordial ocean. But sanity-minded people don't require monkeys, those marvelous subjects for any number of experiments designed to produce certain responses, to write books and the principle would be served just as well. Why monkeys, then?

Because monkeys are smart. But not smart enough. You can easily imagine monkeys being smart enough to ground typewriters keys in imitation of men, but you can't imagine them smart enough to type them in any way other than at random.

Smart, but not smart enough. Monkeys amuse people because they are smart enough to be like people in some ways, and they bother people for the same reason. Why were these grotesque imitations of ourselves created? Were they practice attempts before the creation of man? (Mark Twain said it was the other way around.)

Or did we and monkeys have common ancestors many millions of years ago, as Charles Darwin suggested? That thought of relationship bothered many people. It still does.

Monkeys alone might not have been so bad. They had tails like other animals. (The Barbary ape is an exception.) In a tailless monkey (what is now called an ape) Africa.

Then, as Europeans explored Africa and the East, tailless, tree true apes were discovered. These were larger than monkeys, as tailless as man, and for cruder to man in their caricatured appearance than tailed keys were.

The discovery came surprisingly late. It was not to 1698 that the first chimpanzee was brought to Europe nor to 1776 that the first orangutan was. The gorilla was not properly described to 1847, just 12 years before Darwin's book was published.

Apes bring up the question of why, lacking far more strongly than tailed monkeys do, if we discards apes. It turns out that in the most intimate details of their inner workings the resemblance is staggering. Modern techniques of testing the immunological [illegible] of protein molecules shows that the chimpanzee's proteins are closer to man's than to any other species. The chimpanzee is closer to man, biochemically, than it is to the gorilla.

The most important physical difference between man and the chimpanzee lies in the size of the brain. The human brain is four times as large as the chimpanzee brain, and it is capable of matters infinitely beyond the power

To those who will not endure the thought of any relationship between man and other primates, the mental difference remains, even if the physical difference vanishes. It can be argued that the gap in intelligence between man and even the most intelligent of other animals is too great to be bridged.

For instance, man can talk. Other animals (even as low in the scale of life as bees) can signal in one way or another (primitive emotions and desires — I'm scared. I'm hungry. Go away. Let's make love. I'm lost. Only man, however, can develop a complicated set of modulated sound symbols to express shades of meanings and esoteric abstractions.

Many attempts have been made to teach young chimpanzees to talk. They have all failed. Chimpanzees brought up with human babies develop more quickly and outstrip their child companions until the stage at which children learn to talk. Then the baby chimpanzee is outdistanced forever.

Men can talk because they are capable of handling the muscles of their tongues, throat, lips and so on with the greatest delicacy. The ability to do so is governed by a part of the brain called Broca's convolution. Damage that section and a human being can no longer speak but he can still communicate by gesture.

Chimpanzees lack the equivalent of Broca's convolution, but in the wild they communicate by gesture too. It occurred to Beatrice and Allen Gardner at the

University of Nevada at Reno, in 1966, to try to teach the American Sign Language to a 10-month-old female chimpanzee they called Washoe. They were amazed at the results. Washoe learned dozens of symbols, used them correctly, understood them easily, and made up new combinations of symbols which she then used appropriately.

Other chimpanzees were also taught. One chimpanzee was taught to manipulate magnetized counters bearing symbols, and learned to understand and construct sentences with all due attention to grammar and punctuation, the near equivalent of reading and writing. Chimpanzees have been taught to manipulate those symbols by means of a kind of typewriter. Chimpanzees have taught symbols to other chimpanzees. So chimpanzees can communicate at the equivalent of a simple human language, provided you grant that language in terms of movements they are physiologically equipped to handle.

Can we teach chimpanzees enough to put them to work for us? Often animals have been tamed and put to work—dogs, horses, reindeer, llamas, yaks, oxen, camels, elephants and so on. They aren't as intelligent as chimpanzees, of course, but surely intelligence is no disqualifier.

After all, human beings can also be trained to do enforced work. The slave under the overseer's lash, is treated as no more than a more intelligent horse.

Why, then, not a chimpanzee as well?

In my opinion that won't work. Chimpanzees are too smart to settle down to dull, repetitious straining (also in response to human signals). On the other hand, they are not smart enough to understand the futility of rebellion as human slaves are (or clever enough to make slavery as tolerable as possible as human slaves sometimes do).

In short, chimpanzees are smart enough to do the work—but not smart enough to be enslaved. And maybe that is smart enough see

NATURE
April 12, 1974

science on television

US "Nova" less than super

Miranda Robertson

SUNDAY March 3 this year saw the first in the science series "Nova", an attempt by the WGBH-TV, Boston backed by some of the more important science grant-giving bodies, to popularise the activities of scientists. The material for the programme, which will be transmitted by most of the 234 stations of the public broadcasting service, will comprise hour-long feature films drawn from various sources and including some originating with WGBH-TV, which will produce the programmes with the cooperation of the American Association for the Advancement of Science.

A sample preview of two of the films was presented at the meeting of the American Association for the Advancement of Science in San Francisco at the end of February, just before the series was due to start. The sample comprised a BBC feature of the filming of wild life in Britain, and a WGBH-TV film on pre- and exobiology which, it cannot be denied, suffered by comparison.

To begin with, the BBC's colour was superior; and they had, in the pond and tree life of Oxfordshire, (if not in the bearded fauna of the Oxford Zoology department) the more photogenic subject. It is hard, after all, to imagine anything much less visually enthralling than a flask full of nascent amino-acids, however exciting its implications. But it was of laboratory shots of this kind, symmetrically interspersed with explanatory face-to-face monologues from such exobiological eminences as Leslie Orgel and Carl Sagan, that the film was principally composed.

The aim was to cover what can be guessed about the origin of life on Earth from the geological record and from attempts to reproduce the first chemical steps in the laboratory, as well as the current best guesses on the possibility of life elsewhere. The personnel in the field seemed fairly represented and the main ideas and experiments came over without conspicuous error or confusion.

But the film as a whole (with the possible exception of a somewhat gratuitous excerpt from Disney's "Fantasia") was visually dull, and the script did little to compensate.

As messages in the media go, the health series planned for the Autumn by Children's Television Workshop, the makers of "Sesame Street", looks like making better television. They have, of course, the advantage of being able to recruit the talents of professional entertainers: warnings about hypertension are more arresting in the black treacle tones of a first-rate blues singer than in the reedy ones of a medical expert.

Hypertension, in fact, has been singled out as one of the most important health hazards to US citizens, not least because it is prevalent in the black community. The other great 'national epidemic' is obesity, which, according to CTW, affects 60% of American men and 40% of American women. Hence a skit entitled "Fatman", featuring the Fatmobile and a villain called the Nibbler. The humour is unsophisticated, but then so presumably is most of the audience. More important, this public-spirited assault on some of the nation's great health problems looks like being eminently watchable.

TV GUIDE
May 11-17, 1974

REVIEW
by Cleveland Amory

NOVA

We yield to no man—and few persons—in our admiration for public television and particularly for such PBS shows as The Forsyte Saga, The Six Wives of Henry VIII and Upstairs, Downstairs. But, just between you and us, we're getting a little weary of public television's dependence on British television. All of the above shows, for example, are imports from Britain. We understand public television's fiscal difficulties and duly note same. But the fact remains that in the case of this program, Nova—meaning, presumably, something new—we have what a release calls "science adventures for curious grownups" that is mostly Rent-a-Series. Although it is funded by the American Association for the Advancement of Science, the Carnegie Corporation of New York, the National Science Foundation and the Polaroid Corporation, nearly half of Nova's 13 shows are olde English jobs.

It would be one thing if these episodes were of such extraordinarily high quality that buying them from the BBC was imperative. But with the possible exception of the first, "The Making of a Natural History Film," which has won pretty nearly every award abroad and one that we previewed, "The Case of the Midwife Toad," the fascinating story of a revolutionary evolutionist, such has not been the case. Take, for example, "Whales, Dolphins and Men." This BBC-Time Life production, interesting as it was in the scenes of the Japanese slaughter of whales (scenes, presumably, bought from the Japanese), was in the main filled with endless footage of the now all too familiar dolphin testing. How long, after all, can you look at scientists standing around watching a dolphin in a tank before you begin to wonder if the dolphin shouldn't be watching the scientists? Another dull one was "The Crab Nebula," a computer-and-telescope-filled opus about the remnants of a star that apparently create a vast amount of energy. Not enough energy, however, to keep anybody awake, with the possible exception of some office machines.

On the plus side, there have been two really fine programs. The first was entitled "Strange Sleep"—an exciting, well-acted and interestingly written dramatization of the discovery, on the part of two dentists and two doctors, of anesthesia. It was moving and it spared no one, particularly not the medical establishment. The second was a show called "The First Signs of Washoe," the story of a 10-month-old chimpanzee born in the wild who, in four years of living with psychologists Allen and Trixie Gardner, learned to communicate in sign language. When, finally, a toy doll was put in Washoe's cup and she signaled "Baby in my drink," somehow it made not only this program but the whole series worth while.

These two shows were not produced by the BBC but by WGBH in Boston. Maybe next year some more "locals" will get a chance to show us what they can do. The reason the British so often act better, write better and film better might be, after all, because they have had more practice.

ARIZONA DAILY STAR

A Scientific Program For The Unscientific

By TOM RISTE
Star Television Writer

You do not have to be a scientist to enjoy "Nova."

You may even be one of those people who tune out the very thought of a scientific anything. But if you love mysteries, unraveling a hard puzzle, the excitement of thinking along with a brilliant mind — then chances are you're going to like "Nova."

"Nova" is the new television series of science adventures for curious grownups and youngsters alike. And all you really need to qualify is the "curious" part.

Tonight at 6:30 Channel 6 will be presenting the second episode in this new series, "Where Did the Colorado Go?"

The Colorado River (you know, the water you cross over when you go to California) used to flow into the ocean like any good river should. Until about 1939. Now this once-mighty river sinks stagnant into the desert almost 20 miles inland from the sea.

We now know the effects of our technological "improvements." "Where Did the Colorado Go?" traces that story and points the way to methods that might help us avoid destroying magnificent resources in the future.

It all started with a pretty big miscalculation by some scientists — that the flow of the Colorado was twice what it actually was. A dam was built to provide energy. And then another dam was built for irrigation. Each one created as many problems as it solved.

We are now at the point where this mighty river is a trickle of stagnant water at its southernmost end. Scientists are busy figuring out how to repair the damage already done. And if they come up with the answers, we can both prevent the misuse of our natural resources in the future and figure out productive ways of harnessing them for a better life, for all.

C. Wes Ferguson, professor in the Tree-Ring Laboratory at the University of Arizona, appears on tonight's program.

"Where Did the Colorado Go?" is a WGBH-TV in Boston effort in cooperation with BBC. "Nova" is produced by WGBH and the Public Broadcast Service, with the advice and cooperation of the American Assn. for the Advancement of Science. The executive producer is Michael Ambrosino.

THE BOSTON GLOBE
March 1, 1974

WGBH's 'Sabbath' off to a rich start

NIGHT WATCH / PERCY SHAIN

Nova, Ch. 2 ★★★★

WGBH-TV's new Sabbath science series could not possibly have a better send-off than this extraordinary BBC-produced documentary on underwater life to be aired Sunday night from 7:30 to 8:30 on Channel 2.

It is, of course, a classic of its kind. Titled with typical British understatement, "The Making of a Natural History Film," it was produced in 1972 and swept any number of national and international awards.

It is fascinating on two levels, first as a nature lesson that will completely absorb the viewer, and second as a demonstration of the complex photography and incredible patience required to get the right shots in the microworld of insects and fish.

Using such tricks of the trade as periscoping mirrors, time lapse and slow motion lensing, windows for walls to get literally inside a nest and lab tanks duplicating natural conditions, it has put together a closeup probe of behavioral patterns like nothing you have ever seen before.

In a wealth of astounding sequences, one remembers most the courting dance of the tiny stickleback, the peeling of an egg to catch the developing embryo, the hatching process within a diaphanous mother, the pike's meal foiled by a spine, the parasitic clouding of a fish eye.

As they say, it's a tough act to follow. If some of the locally produced stanzas even come close to this eye-opening inaugural, this will be a series worth watching.

THE CHRISTIAN SCIENCE MONITOR
April 19, 1974

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Washoe the chimp (and friend), who learns sign language in the May 5 episode of 'Nova'

Probing the puzzles of the universe

'Nova' proves 'scientific discovery can be thrilling entertainment—as in this Sunday's 'Bird Brain'

By Arthur Unger

The excitement of experiment doesn't have to be restricted to the world of science and education. Scientific discovery can be a thrilling entertainment as well. "Nova" (PBS, Sunday, 7:30 p.m., check local listings) has been proving that for the past seven weeks and will continue to do so for six weeks longer on the Public Broadcasting Service. Pro-

Television

duced by WGBH-Boston with the advice and cooperation of the American Association for the Advancement of Science, this series of scientific surveys prepared with the layman in mind has been probing the puzzles of our universe. It is probably one of the most intellectually stimulating entertainments in the annals — and channels — of public education. So much so, in fact, that 17 new "Nova" shows (plus six repeats from the current run) are already slated for PBS next year, according to executive producer Michael Ambrosino.

This Sunday, "Nova" probes the mystery of bird navigation. "Bird Brain," a BBC-Time-Life co-production, records the determination of the scientific community to discover once and for all the secret of bird migration — how 50 percent of our little feathered friends manage to commute between their winter and summer residences without a map or compass. Utilizing everything from helicopters to opaque contact lenses, airplanes to magnetic electrodes, scientists have been able to discover only that, in navigating, the birds use the sun by day and the stars by night, with a bit of the earth's magnetic force. But there's still an awful lot to learn — even as the homing pigeons fly merrily on their way back to their lofts, seemingly unaware of the legions of serious scientists breathlessly tracking them with expensive electronic devices. After a full hour of the fun and games, which scientists like to call "scientific experimentation, the film comes to the conclusion that "for the moment, the scientist remains perplexed."

Well, it is just this kind of perplexity that makes "Nova" so much fun for the nonscientist to watch. I suspect I get a kind of perverse satisfaction out of witnessing a pigeon blithely outmaneuvering man — even if it is apparent that man's technology will eventually triumph. Whether you root for the pigeons or the scientists, watch "Bird Brain" this Sunday — and soar a little.

Learning not dull

From its inception on March 3, "Nova" has been marked by its recognition that dullness is not a prerequisite of learning. And there is the proper assumption that sometimes the technology of the experiment can be almost as interesting as the experiment itself. For example, the first in the series — "The Making of a Natural History Film" was a superb, prize-winning documentary on how the Oxford Scientific Films people accomplish their work. Occasionally, as in the case of last week's "The Crab Nebula," the complexity of the material gets the better of the presentation — and you emerge from the hour feeling that you've

Arthur Koestler (May 12)

witnessed a footrace between enlightenment and confusion with some doubt as to who was the victor. But, on the whole, the series manages to clarify much more than it obscures — and in either case, it is enormous fun to watch while it is happening.

Of the remaining six films in the series, I have viewed two which contain absolutely fascinating material: "The First Signs of Washoe" (May 5) and "The Case of the Midwife Toad" (May 12.) Washoe is a chimpanzee who has been taught to communicate by American sign language. Brought up like a human child in an environment of "Yerish" speakers, Washoe is able to use her vocabulary of 150 words to make amazing contact with the world around her. "The Case of the Midwife Toad" is a dramatized account of the recent Arthur Koestler book about the tragic case of biologist Paul Kammerer whose experiments seemed to refute Darwin's evolutionary theories and partially to confirm Lamarck's theory of inherited acquired characteristics — until the evidence of fraud caused them to be rejected by the scientific community. Now, Mr. Koestler suggests that perhaps Dr. Kammerer was "framed" and there should be a re-evaluation of his work. It is a fascinating case, with Mr. Koestler himself featured in the role of inquisitor. There are other worthwhile programs to come as well — a segment which investigates the abuses involved in medical research on living patients, a study of the nuclear-fusion race, a look at the search for clues to the mystery of the Anasazi Indians of Southwest America, who disappeared about 700 years ago.

Watching "Nova," you may be lulled into believing that you are viewing "mere" entertainment. However, almost despite yourself, you will find that a new awareness of certain scientific theories and concepts is creeping into your consciousness as "Nova" transports the thrill of discovery from the laboratory to your own livingroom.

TIME
April 29, 1974

RESEARCHER ROGER FOUTS TEACHING CHIMP THE WORD "BOOK" IN SIGN LANGUAGE ON *NOVA*

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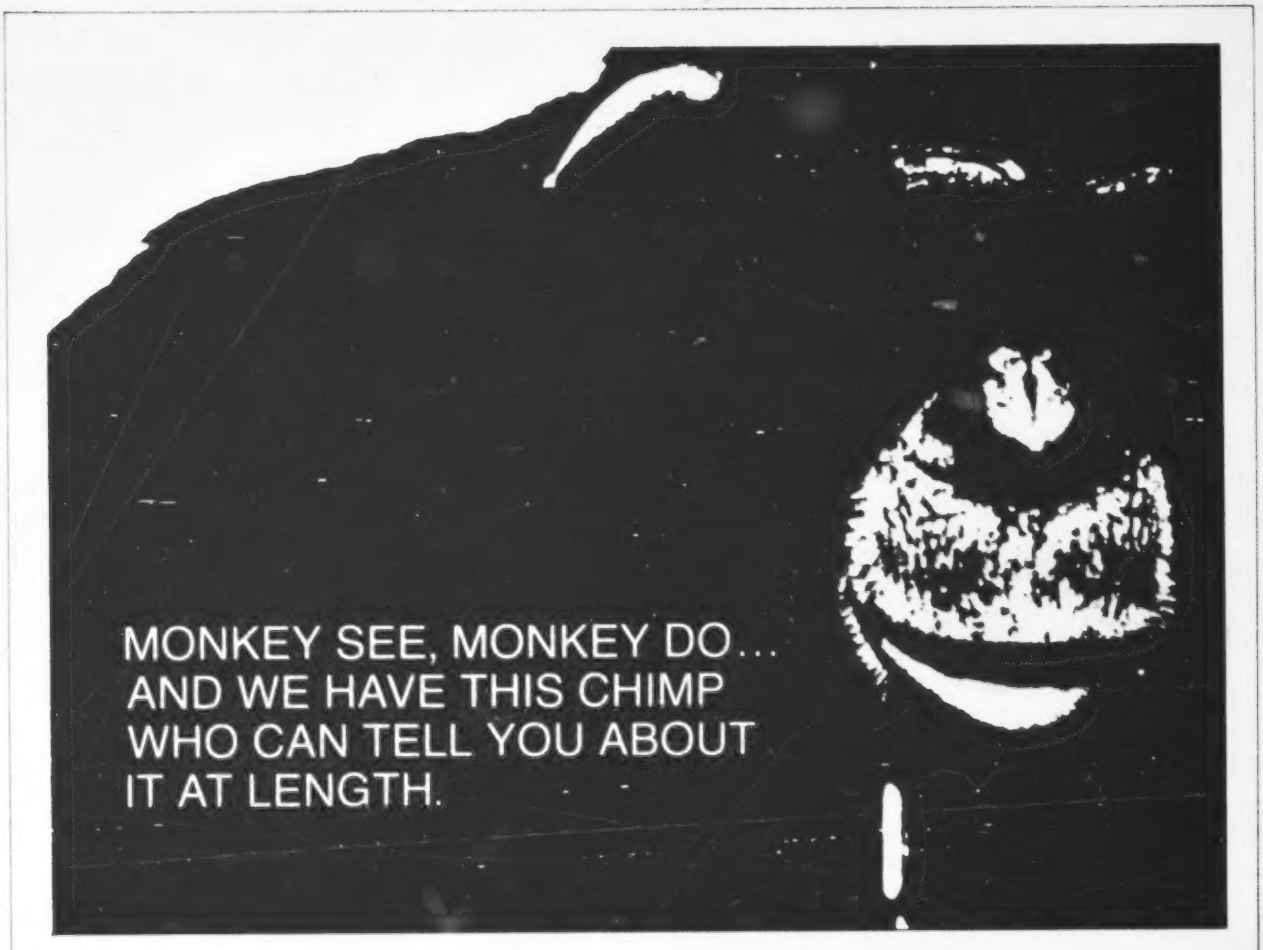
For Curious Grownups

"Of all the subjects of importance to society, the one most systematically neglected by American television is science." So says Michael Rice, vice president of Boston's public television station WGBH. According to a survey made at the beginning of the 1972-73 season, science programs were scheduled for fewer than 25 out of 4,368 prime-time network hours—about one-half of 1%. Further, most of the programs were not really science, but adventure-wildlife travelogues.

Commercial broadcasters have shown little interest in expanding the range of televised science programming, but WGBH is doing something about it. It has produced and, with other public television stations this season, is offering *Nova*, a series of innovative, hour-long shows aimed at filling the void between deadly dull "educational" lecturing and pop-science trivia.

Billed as "science adventures for curious grownups," *Nova* so far has looked to the skies to describe the distant Crab nebula and explain the pulsar, a kind of astronomical time clock that lies within it. The program has gone underseas for a scientific examination of dolphins and whales, resisting the temptation to *Flipperize* its subjects. It has even presented a fascinating inside look at the difficulties that a team of science-film makers encountered in making a nature film. Other shows will explain experiments with Washoe, a chimpanzee who has been taught to speak in sign language, and tackle the touchy subject of medical experiments on human beings.

Produced by WGBH's Michael Ambrosino, the series was modeled on the BBC's *Horizon* series. It also benefits from the expertise of many leading scientists who, says Ambrosino, "are starving for the opportunity to portray science accurately." In *Strange Sleep*, a dramatization of the discovery of anesthesia, eminent Bostonian physicians did a remarkably credible job of acting as they portrayed their medical predecessors. Occasionally, as in *The Crab Nebula*, the program's accuracies are a bit too complex for laymen to follow. But for the most part the shows accomplish their purpose: to stimulate the mind of the curious grownup by raising a new question for every one that they answer.



Washoe is the kind of name you get if you're a 10-month-old African chimpanzee and come to the University of Nevada to learn to talk with your hands. Washoe County surrounds Reno; when Drs. Allen and Trixie Gardner gave the name to the chimp who would shortly become the first non-human ever to learn a language, it was their way of putting the place on the scientific map for keeps. But in the end names and locations are unimportant, as you'll discover on *Nova*'s first program for May.

What *is* important is that Washoe and other chimps (some of whom are named Lucy, Bruno, Lana and Ally) have by now mastered communicating with man by sign language, making sentences and answering questions. Theirs is so far a limited ability—no chimpanzee has gone much beyond 150 or so "words" in amassing a vocabulary—but in the process a whole cageful of linguistic certainties has gone out the window. And there may very well be new and bigger shocks to come.

The Gardners, a husband and wife team of comparative psychologists, had the insight nearly a decade ago to realize that all previous (and unsuccessful) attempts to teach chimps to talk had ignored the physiological problems: although he is generally thought to be the species closest to man and thus the most likely to respond to language lessons, the chimpanzee's articulatory neuromuscular system would probably defeat any attempt at speech, whatever his intelligence.

Noticing that chimps naturally used their hands with great facility, the Gardners concluded that teaching them the fully developed sign language of the deaf might be a more appropriate project. It would, in any case, provide a means of testing language ability that would make questions of anatomical incapacity irrelevant.

Thus, when Washoe's training began in 1966, the Gardners and their assistants deliberately avoided any spoken communication in the chimp's presence, and depended exclusively upon American Sign Language (called Ameslan or ASL), which is the signing used by deaf persons across North America. It's a language in which gestures stand for words rather than letters, and as such is suitable for teaching to very young deaf children . . . or very young chimps.

And Washoe gradually began to

learn and use the signs—slowly at first, but faster and faster as time passed: four signs in the initial seven months, nine in the second seven months, twenty-one in the third. Signs for words like "more" and "open" and "drink" and "hug" and "dirty." And for "Washoe." After three years, she had acquired eighty-five signs; then she almost doubled that total in the following year. More importantly, she used sign language in meaningul, syntactically accurate sentences.

Today, Washoe is still learning. And in her wake a second generation of language-functional chimpanzees is being taught by methods that go beyond the Gardners' first efforts. At a research center in Atlanta, a chimp named Lana operates a language teaching machine with the nonchalance of a keypunch clerk, even when the symbol buttons are repeatedly moved around. Out in Oklahoma (where Washoe herself now lives) there's a chimpanzee called Ally who is able to translate spoken English words for objects into sign language, without the objects' physical presence as a reminder.

And it seems to be only a matter of time until signing chimps have conversations with each other . . . or (and this is the most staggering thought) begin to teach it to their young. What then for the age-old assumption that language is the essential characteristic separating man from dumb (sic) beasts?

NOVA is made possible by grants from Carnegie Corporation of New York, Corporation for Public Broadcasting, National Science Foundation and Polaroid Corporation.

NOVA

May 5:

The First Signs of Washoe

Like *Psychology Today* says: "Don't look back. There's an ape gaining on you."

May 12:

The Case of the Midwife Toad

Paul Kammerer was an Austrian biologist who committed suicide in 1926, after certain experiments of his—which appeared to contradict the Darwinian theory of evolution—proved to be a fraud. But Arthur Koestler now offers substantial evidence that Kammerer was framed. What really happened?

May 19:

Fusion—Energy of Promise

Gas shortages may come and go, yet in the long run we *are* running out of petroleum, coal, even firewood. Well, there's always nuclear power, right? And thermal pollution. And the possibility of a fission reactor's going BLOOOIE! and taking the state of Pennsylvania with it. A *fusion* reactor—a controlled H-bomb—could do the trick without these dangerous side effects . . . only no one's been able to build one. Yet.

May 26:

The Mystery of Anasazi

The Anasazi Indians lived in the southwest part of North America for thousands of years. An agrarian people, they constructed massive complexes that made them the continent's first urban civilization. They seem to have existed largely in peace with nature and with their neighbors. And in 1300 AD they disappeared.

NOVA
Sundays at 7:30 pm on 2, 44 & 57; repeated Mondays at 10 pm on 2, Saturdays at 6 pm on 2 & 57

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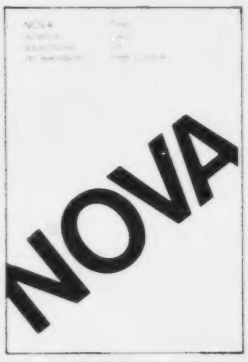
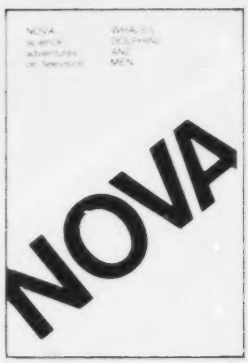
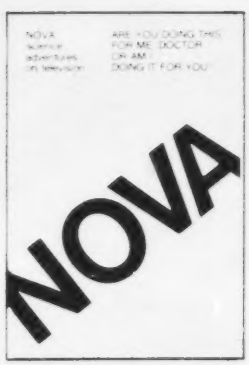
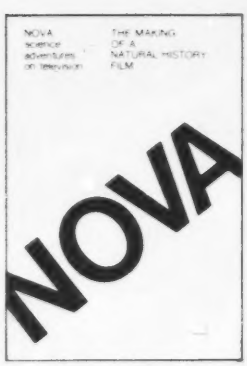
THE BOSTON PUBLIC LIBRARY
1974









This reading list has been prepared
by the Science Reference staff of
the Boston Public Library.

The story of the men who discovered anesthesia - and changed medicine in the 19th century - is a sad story. Some of them died rich and famous. Most of them died forgotten and ridiculed and hopelessly addicted to the drugs with which they experimented.

A WGBH PRODUCTION

PRODUCER: J. FRANCIS CRAUSTON

NOVA is distributed by WGBH-Boston and the Public Broadcasting Service, with the official participation of the American Association for the Advancement of Science.

INTRODUCTION

The discovery of anesthesia revolutionized the medical world, but it was fraught with a controversy as memorable as the discovery itself. It is likely that the following is the sequence of events surrounding the discovery. In 1842 Crawford Long used ether to remove a tumor from a patient's neck, but for reasons which have never been made clear, he did not proclaim his advance to the medical world until 1849. In 1844 Horace Wells inhaled nitrous oxide, and a friend painlessly extracted a tooth. His attempt to demonstrate his discovery to the medical profession was unsuccessful. Then, in 1846, at the suggestion of Charles T. Jackson to use ether as an anesthetic agent, William Thomas Green Morton successfully administered it for the painless extraction of a tooth. He later demonstrated its use at the Massachusetts General Hospital, and from then on it was an accepted medical practice.

The introduction of anesthesia at a time when the most important factor in an operation's success was the surgeon's speed allowed the refinement and development of advanced operative techniques. Lister's theory of antisepsis could now be applied, remarkably improving the chances of survival after surgery.

Today, acupuncture anesthesia may represent the same kind of breakthrough for surgery that ether was a century ago. It has already generated its own controversies over licensing and fees.

Cole, Frank, M. D. Milestones in Anesthesia: Readings in the Development of Surgical Anesthesia, 1770-1940. Lincoln, University of Nebraska Press, 1965.

Each of the articles in this selection of readings was the first to announce an invention of prime importance, or contains the pioneer's account of his own work. The selection includes Henry Hill Hickman's A Letter on Suspended Animation, W.T.G. Morton's Insensibility During Surgical Operations Produced by Inhalation, Carl Koller's On the Use of Cocaine for Producing Anesthesia on the Eye, Harvey W. Cushing's On Routine Determinations of Arterial Tension in Operating Room and Clinic, and G.H.W. Lucas' and V.E. Henderson's A New Anesthetic Gas: Cyclopropane - A Preliminary Report.

Because no interpretations or controversies relevant to these events are presented, the reader can contemplate their importance as scientific discoveries which have allowed surgical techniques to become sophisticated and safe life-saving procedures.

Davis, David A., M.D. Historical Vignettes of Modern Anesthesia. Philadelphia, Davis, 1965.

Dr. Artusio, editor-in-chief of the Clinical Anesthesia series, describes this volume as having "the flavor of the progress in anesthesiology during the last forty years," rather than as a complete history of modern anesthesiology. The first chapters describe anesthesia during the American Civil War and the World Wars. There follow the history and research behind endotracheal intubat...

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The New York Times
May 10, 1974

TV: Science on 'Nova'

13-Part Series Gathered by WGBH Offers Some Impressive Programs

By JOHN J. O'CONNOR

Nicely demonstrating that necessity can be the mother of inventive programing, Boston's WGBH has gathered together a 13-part science series for public television. "Nova," presented on Sundays at 7:30 P.M. on the Public Broadcasting Service, is a budget-conscious pastiche, a bit uneven around the edges but often—and especially in recent weeks—solid and impressive.

With Michael Ambrosino as executive producer, the series consists of some programs from WGBH, some imported from Britain, (mostly from the British Broadcasting Corporation) and some made as WGBH-B.B.C. co-productions. Occasionally, as in a study of the Colorado River and a portrait of dolphins, the effect comes perilously close to a dull edutional film made for Biology I or Introduction to Geology. But, more surprisingly, "Nova" frequently proves that television and science are not as incompatible as the commercial networks seem to have assumed.

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Last Sunday, for instance, there was the intriguing profile of "The First Signs of Washoe," produced for WGBH by Simon Campbel-Jones. Washoe is a chimpanzee raised in the home of Allen and Trixie Gardner, faculty members of the University of Nevada at Reno. The project involves teaching Washoe how to "talk" with American sign language, the language of the deaf.

The lessons were carefully recorded on camera. By the end of the hour-long program, the viewer was witnessing the startling fact of Washoe's using a 150-word vocabulary. The chimp was able not only to use isolated words, but also to put words together in sequences she had not been taught. The thin barrier between man and animal visibly crumbled a little further.

This Sunday, with a B.B.C. film produced by Bruce Norman, "Nova" offers a dramatized treatment of Arthur Koestler's "The Case of the Midwife Toad." It is the story of Paul Kammerer, an Austerian biologist who committed suicide in 1926 after being accused of forging his laboratory experiments.

The story of Kammerer is the story of intense battles within the scientific community about theories of evolution. His experiments with salamander and toads indicated that certain adapted environmental changes in parents could be inherited automatically by their offspring. These apepar to support the "nature ruled by purpose" theories of Lamarck, whoich were opposed to the generally accepted "blind chance" or natural selection concept of Darwin.

The attacks on Kammerer's work were led by Britain's William Bateson, a biologist and himself a former but experimentally frustrated disciple of Lamarck. Then, much of Kammerer's laboratory evidence, compiled over 15 years, was destroyed in World War I. One surviving exhibit was a midwife toad. Years later, after much worldwide publicity under headlines of "Transformation of the Human Race" and "Race of Supermen," the specimen was discovered to contain India ink.

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"The Case of the Midwife Toad," incorporating interviews with Mr Koestler and several scientists, does not attempt to prove Kammerer's thesis. It suggests only that his time-consuming experiments be repeated, as he requested before his death. Mr. Koestler observes that, even if successful, the experiments might prove "not that Lamarck was right but that he may not have been entirely wrong."

Demanding close attention, the superbly constructed program provides rewarding and provocative television. It's not often, unfortunately, that the TV audience is given an opportunity to ponder possibilities on the level of evolution's being a tale told by an idiot or a grand design still hidden from view.

"Nova" is described as "science adventures for curious grown-ups." That would appear to be selling the series short. It is for curious persons of all ages.